EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY

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Dedicated

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Dr. Ilmjot Kaur Tiwana

LIST OF ABBREVIATIONS

%	Percentage
ASA	American Society of Anaesthesiologists
BMI	Body Mass Index
BIS	Bispectral index
CAM	Confusion Assessment Method
CHEOPS	Children’s Hospital Eastern Ontario Pain Scale
COPD	Chronic Obstructive Pulmonary Disease
DBP	Diastolic Blood Pressure
DOS	Delirium Observation Scale
EA	Emergence Agitation
ED	Emergence Delirium
EtCO2	End-tidal Carbon dioxide
ENT	Ear, Nose & Throat
e.g.	exempli gratia/for example
FESS	Functional Endoscopic Sinus Surgery
HR	Heart Rate
i.e.	id est/That is
I.M.	intramuscular
inj.	Injection
i.v.	Intravenous
kg	Kilograms
MAP	Mean Arterial Pressure
min	Minutes
mg	Milligram
mm	Millimetre
NIBP	Non-invasive Blood Pressure
NRS	Numeric Rating Scale

OR	Operating Room
PACU	Post-Anaesthesia Care Unit
PAED	Paediatric Anaesthesia Emergence Delirium
PCV	Pressure Controlled Ventilation
POCD	Postoperative Cognitive Dysfunction
POD	Post Operative delirium
RASS	Richmond Agitation Sedation Scale
RCT	Randomised Controlled Trial
RSAS	Riker Sedation-Agitation Scale
RR	Respiratory Rate
SBP	Systolic Blood Pressure
SpO2	Saturation of Peripheral Oxygen
T2DM	Type 2 Diabetes Mellitus
TIVA	Total Intravenous Anaesthesia
VIMA	Volatile Induction and Maintenance of Anaesthesia
vs	Versus

ABSTRACT

Introduction: Emergence agitation (EA), defined as restlessness, disorientation, excitation, and/or inconsolable crying, is a common phenomenon during early recovery from general anaesthesia. It may lead to respiratory compromise, nausea, vomiting, and may also cause an increase in blood pressure, heart rate, and myocardial oxygen consumption. Although EA is not a prolonged condition, it increases the risk of self-injury and delayed discharge, and raises medical care costs. It is obvious that effective EA prevention improves the clinical outcomes. Nasal surgeries are considered an independent risk factor for emergence agitation, due to nasal cavity packing postoperatively. Whether preoperative nasal packing reduces post op agitation in these patients, is a less explored field.

Aim of Study: We propose to study whether preconditioning with preoperative nasal packing reduces emergence agitation in adult patients undergoing nasal surgery under general anaesthesia.

Materials & Methods: A randomised controlled study was conducted on 90 patients undergoing elective nasal surgery, divided into 2 groups. The study group underwent nasal packing with saline soaked hydroxylated polyvinyl acetate sponge (merocel) 12 hours before surgery. The control group did not undergo any intervention. General anaesthesia was administered in both the groups with the same technique. Post operative emergence agitation was assessed in both groups using Richmond's Agitation Sedation Scale (RASS). Tolerance for nasal packing was assessed both before and after surgery in the study group, and postoperatively in the control group.

Results: The incidence of emergence agitation came out to be 11.1% in the study group and 73.3% in the control group with a significant p-value of 0.001. The severity of agitation, that was assessed using RASS score was significantly more in the control group at 0 and 5 minutes.(p=0.001 & 0.005 respectively). Postoperative tolerance for nasal packing was also significantly better in the study group as compared to the control group.

Conclusion: Preoperative nasal packing is an effective non-pharmacological measure for preventing emergence agitation in patients undergoing nasal surgery. This method not only decreases the use of additional pharmacological measures but also helps in improving overall comfort and tolerance of the patients in the postoperative period.

Keywords: Emergence agitation, Nasal surgery, Tolerance, Nasal Packing, RASS.

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INTRODUCTION

Emergence agitation is defined as a state of mental confusion, restlessness, and disinhibition presenting as hyperexcitability, agitation and hallucinations during the recovery phase from general anaesthesia. It usually occurs immediately following emergence from anaesthesia and usually lasts for 5-15 minutes [1] but may last up to 48 hours in extreme cases. [2] Emergence Agitation is confined to the emergence period as consciousness is restored, which sets it apart from other postoperative delirium states. [3] This post anaesthetic emergence agitation was first reported by Eckenhoff et al in 1961 and referred to as emergence excitement. Emergence agitation varies in its severity from milder forms that include restlessness and disorientation to severe forms that are characterised by wild thrashing and shouting. The latter entity comes under the term emergence delirium. Emergence Delirium (ED) is not fully equivalent to Emergence Agitation (EA); Agitation is an unpleasant state of heightened arousal that often manifests as a common symptom in patients dealing with pain, fear, anxiety and more complex neurobehavioral conditions such as "delirium". The Diagnostic and Statistical Manual of Mental Disorders defines delirium as a transient, fluctuating disturbance of consciousness, attention, cognition, and perception. ED can manifest with hypoactive, mixed, or hyperactive signs akin to agitation.[4] However, EA and ED have frequently been utilized interchangeably in various studies.[5] Additionally, the assessment tools like the Richmond Agitation Sedation Scale or Riker Sedation Agitation Scale are identical for both conditions.

The overall incidence of emergence agitation is 22.2% and can be as high as 50-80% in children. The exact pathogenesis of emergence agitation still remains unclear, however there are some predisposing factors such as age, male gender, type of surgery, anaesthesia technique, post-operative

pain, presence of endotracheal tube and urinary catheters that are known to stimulate this condition.[6-8] Other proposed risk factors include pre-operative anxiety related to surgery, new environments, physiological conditions like sepsis, hypoglycemia, electrolyte imbalance, hypoxia, hypercapnia and residual medication effects.[9] These factors cumulatively may lead to increased sympathetic tone resulting in excited state during recovery from anaesthesia. The occurrence of emergence agitation may be influenced by an imbalance in the brain's excitatory and inhibitory pathways, as well as by how hypnotic agents affect the cortical and subcortical networks differently. Some theoretical mechanisms suggest unblunted sympathetic activation in response to various internal (eg, anxiety or flashbacks) or external (eg, pain) stimuli as consciousness returns.[3] To study the underlying mechanisms of Emergence agitation, functional magnetic resonance imaging has been used. It showed that delayed recovery of subcortical thalamoregulatory systems could contribute to impairments in cortical integration of information, resulting in confusion and agitation.[10]

Thus the etiology of emergence is multifactorial and it is crucial to identify the causes and modify them when possible to reduce its incidence and severity.[10]

Literature suggests that ENT (Ear, Nose, Throat) surgical procedures have higher incidence of Emergence agitation. In a study done by Doerrfuss et al. [11] incidence of emergence agitation in ENT surgeries came out to be 61.4% in the pediatric population as compared to 34.3% in other surgeries. Elsersy et al. [12] reported an incidence as high as 68% and Xu et al. [13] reported an incidence of 35.6% in adult patients undergoing functional endoscopic sinus surgery. Kim et al. [14] also reported increased incidence of emergence agitation in the post-anaesthesia care unit (PACU), particularly among patients undergoing

nasal surgery. This is explained by the fact that these patients have their nasal cavities packed with surgical foam/merocel after surgery to achieve hemostasis and prevent adhesions and at times to fix intranasal structures in operations like septoplasty. [15] This packing causes a sense of suffocation that contributes to emergence agitation. Increased incidence of emergence agitation in nasal surgeries might also be due to sudden loss of functional senses and discomfort to surgical organs. Also, a tracheal tube can be distressing in partially awake patients. Such a situation can be more stressful in nasal surgery patients as nasal cavities are already packed.

This nasal packing that remains in situ post-operatively can cause pain and discomfort to the patients. [15] The use of materials like gauze soaked with vaseline, sponges composed of polyvinyl acetate (e.g.Merocel), silicone splints and various balloon tamponades have been described. The use of these nasal tampons can induce an uncomfortable sensation of nasal fullness when secretions accumulate. This may lead to discomfort, epiphora, local infection, difficulty swallowing and breathing, sleep disturbances and pain during removal. For assessing the effects of nasal packing Oğuzhan DİKİCİa et al [15] performed a nasal packing survey using a scale graded from 0-4 after the nasal packing was removed in the postoperative period.

Severity of agitation can be assessed using various scales that have been defined. Standard rating scales are required to monitor, evaluate and hence intervene at appropriate times. Various agitation scales have been in use to stratify the degree of emergence agitation. Richmond Agitation Sedation Scale (RASS), Riker Sedation Agitation scale, Confusion Assessment Method for Intensive Care Unit (CAM-ICU), Delirium observation screening (DOS) scale, Paediatric Anaesthesia Emergence Delirium (PAED) scale, Delirium Rating Scale (DRS) are few of the scales

commonly used. Systematic assessment of sedation and agitation is valuable in titrating sedative medications and evaluating agitated behaviour, yet the existing scales have inherent limitations.

The Richmond Agitation–Sedation Scale (RASS) is used to determine the presence of EA. The RASS is a 10-point scale that includes four levels for anxiety or agitation, one level for documenting a calm and alert state, and five levels for sedation. EA in our study is defined as RASS ≥+1 [1]. RASS of +1 to +4 denotes increasing level of agitation and a score of -1 to -5 denotes increasing level of sedation. [16] Studies have used RASS for subtyping of delirium. Persistent scoring of +1 to +4 score is defined as hyperactive delirium and a persistent scoring of 0 to -3 during all assessments comes under hypoactive delirium. RASS has a single-item numerical structure, avoiding the complexity of summing multiple subscale scores. The use of positive numbers for agitation and negative numbers for sedation offers a logical approach to enhance recall while permitting a robust 10 levels for evaluation of response. [17]

RICHMOND AGITATION SEDATION SCALE (RASS)

SCORE	TERM	DESCRIPTION
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent non purposeful movement, fights ventilator
+1	Restless	Anxious but movements not aggressive or vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (>10 seconds)
-2	Light Sedation	Briefly awakens with eye contact to voice (<10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)
-4	Deep Sedation	Movement or eye opening to voice (but no eye contact)
-5	Unarousable	No response to voice or physical stimulation

Emergence agitation increases the risk of complications such as - re-bleeding, falls, self-extubation and catheter removal, potentially leading to complications like hypoxia and aspiration. In addition it can increase the

demand of human resources, can cause injuries to medical staff and prolong the hospital stay of the patients. Emergence agitation can be costly in various forms: in terms of morbidity, human resources and at a financial level. Self extubation and removal of catheters can lead to aspiration and need for emergency surgery, respectively, thereby increasing morbidity. [18] As many as six staff members may be required to restrain an agitated patient. There also remains an increased risk of injury to the staff. Financially, it can be a burden for the patient and family due to increased consumption of pharmaceuticals and prolonged hospital stay. [19]

Current literature on emergence agitation mainly focuses on the paediatric population. Also, only the pharmacological management of EA using ketamine, dexmedetomidine, tramadol, intravenous anaesthetics etc. has been studied. The non pharmacological measures have not been explored enough. Although the pathology of emergence agitation remains unclear, the agitation caused by sensory abnormalities during emergence which are often encountered by patients undergoing ENT surgeries, may play an important role. [13] Preconditioning to this sensory discomfort preoperatively, may aid in reducing agitation. [20] Therefore, this study was designed to observe whether preconditioning the patients undergoing nasal surgery with nasal packing preoperatively can reduce the incidence of emergence agitation in adult patients.

AIMS AND OBJECTIVES

- To compare the effect of preoperative preconditioning with nasal packing on emergence agitation in patients undergoing nasal surgeries.
- To study patients tolerance preoperatively and postoperatively.

REVIEW OF LITERATURE

Emergence Agitation is a well-known phenomenon in the postoperative period. However, the literature concerning this clinical problem among adults is limited. Many times EA is grouped with postoperative delirium (POD) and misnamed as “emergence delirium” (“ED”), this hyperactive state is limited to the emergence period after general anaesthesia before regaining full consciousness.

Emergence agitation was first documented by Eckenoff et al. [21] in 1960 and was described as emergence excitement. Over 14000 patients who underwent surgery under general anaesthesia were included. In this survey young age, use of barbiturates, and painful operative procedures were identified as risk factors for EA.

The consequences of inadequate sedation and analgesia in hospitalised patients can pose substantial risks to them including self-removal tubes and catheters. Hence reliable tools are required to enhance communication between caregivers, improve the consistency in drug administration and which can be used to derive sedation protocols.

In a cross-over study done by Uezono et al. [22] in 2000, the effect of propofol vs sevoflurane on emergence agitation was compared in paediatric patients undergoing minor non-invasive surgeries. Sevoflurane anaesthesia was associated with a significantly increased incidence of emergence agitation i.e.38% as compared to propofol i.e.0%. Patients' satisfaction after anaesthesia was also significantly better in the propofol group.

Sessler et al. [17] in 2001 studied the inter-rater reliability of the 10 point Richmond Agitation Sedation Scale (RASS) among five investigators

including doctors and nurses. It was concluded that RASS was logical, easy to administer, has high reliability and validity in medical and surgical patients.

Schuurmans et al. [23] in 2003 studied the DOS scale for its efficacy, validity and reliability to recognize delirium in early stages by observation. It was concluded that the DOS scale has a satisfactory validity along with high reliability.

Kain et al. [24] in 2004 performed a study based on the hypothesis that the phenomenon of emergence delirium is closely related to preoperative anxiety and postoperative maladaptive behaviours. It was concluded that odds of developing marked symptoms of emergence delirium were more in children having preoperative anxiety and similarly incidence of postoperative behavioural change was more in children developing delirium.

In a meta analysis done by Kuratani et al. [25] in 2008, 23 studies were included to compare the incidence of emergence agitation with use of sevoflurane v/s halothane. It was revealed that sevoflurane was more significantly associated with emergence agitation as compared to halothane.

Pieters et al. [26] in 2010 in a prospective RCT enrolled 42 paediatric patients scheduled for tonsillectomy and adenoidectomy to compare effect of sevoflurane vs propofol on EA. PAED and CHEOPS scale was used to evaluate agitation, and no significant difference was found between the propofol and sevoflurane group. Using propofol for maintenance was linked to reduced requirements for pain medication in the recovery room.

Yu et al. [27] in 2010 studied that doxapram administration, pain and presence of a tracheal tube and/or a urinary catheter appear to be the most important causes of postoperative agitation. To avoid this complication, they suggested, whenever possible, to use intravenous anaesthesia, to remove endotracheal tubes and urinary catheters as early as possible, and to provide adequate postoperative analgesia. [14]

Bryson et al. [5] in 2010 discussed agitation, delirium and postoperative cognitive dysfunction (POCD) in his study. They inferred that these terms, although confusing, hold variable significance for the perioperative physicians. Also methods used to measure agitation or delirium must have internal validity, so that outcomes can be comparable with other studies.

In 2011, Yuki et al. [28] conducted a study examining psychological disturbances in children following general anaesthesia. They suggested that anxiety or distress experienced during induction, along with individual personality traits, may strongly correlate with these behavioural complications.

Grover et al. [16] in 2012 studied various types of scales used to screen and diagnose delirium. They also discussed instruments used for subtyping the delirium, and grading its severity. Neecham confusion scale and DOS scale were most suitable for screening patients admitted in surgical and medical wards. CAM is the most useful diagnostic instrument for its accuracy and ease of use by doctors.

In a randomised trial done by Kim et al. [29] in 2013 it was concluded that intraoperative infusion of dexmedetomidine provided smooth and hemodynamically stable emergence. It also improved the quality of recovery following nasal surgery.

Chen et al. [18] in 2014 investigated emergence agitation among patients following craniotomy. The sedation-agitation scale was evaluated within the first 12 hours post surgery. Factors independently predicting agitation included male sex, history of long-term use of antidepressant drugs or benzodiazepines, frontal approach of the operation, method and duration of anaesthesia and presence of endotracheal intubation. TIVA and balanced anaesthesia with short duration were identified as protective factors.

In a systematic review done by Costi et al. [30] in 2014, effect of sevoflurane on emergence agitation was compared with other anaesthetic measures (pharmacological & non-pharmacological). Measures including halothane, propofol, dexmedetomidine, ketamine and opioids were associated with a significant decrease in incidence, while desflurane, midazolam or isoflurane were not related to any significant effect on emergence agitation.

The overall incidence of emergence agitation in nasal surgeries was 22.2% in a study done by Kim et al. [14] in 2015. Patients in the PACU with a RASS of ≥+1 at any time were considered to have emergence agitation. Six variables showed significant association with emergence agitation: younger age, recent smoking, sevoflurane anaesthesia, postoperative pain rated ≥5 on the numerical rating scale (NRS), presence of an endotracheal tube and a urinary catheter.

In 2015 Khurshid et al. [31] randomly assigned 100 patients undergoing nasal surgery into 2 groups of 50 each, where one group (Group D) received dexmedetomidine infusion and the other group (Group C) received normal saline infusion. Incidence of emergence agitation was lower (26%) in group D and compared to group C (50%). The study

concluded that dexmedetomidine led to a smooth emergence with improved hemodynamic stability.

Vishwanath et al. [9] in 2015 published a systematic review elaborating the neurophysiology, organic causes, perioperative risk factors, diagnostic modalities and methods to prevent and treat emergence agitation. The study highlighted that two critical factors contributing to the morbidity and mortality of ED are-ineffective screening and identification of at-risk patients, along with the absence of standardised diagnostic protocols.

In 2015, Liu et al. [8] conducted a study aimed at identifying the incidence rates and risk factors associated with emergence agitation in adults undergoing nasal surgeries. They found several risk factors associated with this condition, including younger age, male gender, preoperative anxiety, history of smoking or cerebrovascular disease, presence of an endotracheal tube or urinary catheter, inhalational anaesthesia and postoperative pain.

In a prospective, observational cohort study done in 2016, Munk et al. [1] assessed adult patients recovering from general anaesthesia using RASS. ED in their study was defined as RASS ≥+1 and associated complications/consequences were noted. Male gender, endotracheal tube and volatile anaesthetics were significantly related to ED in their study. There was an incidence of accidental i.v. removal in 1 case and requirement of additional staff in 20 cases.

A study by Kasem et al. [32] in 2016 was conducted to evaluate the effectiveness of preoperative external nasal compression on the incidence of postoperative agitation in nasal surgeries. Sixty adult patients of ASA I or II, between 20 and 45 years of age of both sexes, nonsmokers, with BMI less than or equal to 30, who were scheduled to undergo nasal

surgery under general anaesthesia, in which unilateral or bilateral nasal packing was planned to be used until 24 h after surgery, were included in the study.

Hobson et al. [33], in their 2016 review, comprehensively addressed perioperative complications associated with anaesthesia. They not only highlighted predictors of these complications but also detailed preventive measures and management strategies.

Jee et al. [34] in 2017 performed a prospective, double-blind study, in which 100 adult patients were allocated randomly to 1 of 2 groups (each n=50). Patients received neoplasm after induction of anaesthesia (nefopam group) or 100mL of saline (control group). It was observed that administering Nefopam infusion effectively prevents and reduces the severity of emergence agitation following nasal surgery without causing any delay in extubation.

Elsersy et al. [12] in 2017 examined 140 ASA I and II patients who were randomly assigned to one of two groups: a premedication group that received Phenergan 25 mg IM and Atropine 0.5 mg IM, or a control group that received an equal volume of intramuscular water for injection. It was concluded that premedication with Atropine and Phenergan along with pain, smoking, young age, male gender serve as risk factors for postoperative agitation in adults undergoing FESS.

Garg et al. [35] in 2018 performed a randomised controlled trial to assess the effect of dexmedetomidine on incidence of emergence agitation, requirement of desflurane, intraoperative hemodynamics and recovery after general anaesthesia. 72 adults undergoing elective nasal surgery were included in the study. Incidence of EA in the control group was significantly higher (52.8%) than the dexmedetomidine group, in which no patient developed agitation. 5.6% patients in the control group developed

dangerous agitation that required pharmacological intervention. Mean heart rate was significantly higher in the control group although mean arterial pressure was comparable in both the groups. However, the control group had significantly less residual sedation compared to the dexmedetomidine group.

Fields et al. [36] in 2018 performed a study to identify various risk factors and complications associated with emergence agitation in adults. Substance misuse, obesity, cognitive or psychiatric impairment and indwelling tubes and catheters were some of various risk factors. It was also observed that patients who were agitated at emergence had more incidence of pulmonary complications and delirium in the PACU.

In a randomised controlled trial Kurhekar et al. [2] in 2018 compared the effect of midazolam v/s dexmedetomidine for prevention of EA in adult nasal surgeries. The incidence of EA using the Riker Sedation Agitation Scale was comparable in both groups. It was observed that patients in the Midazolam group were agitated even in the postoperative period.

In a prospective observational study done by Ramroop et al. [37] in 2018 reported a higher incidence of emergence agitation in the adult population with the use of sevoflurane. The incidence of emergence delirium reported was 11.8%. Significant risk factors associated with this condition included age over 65 years, emergency surgeries, prolonged surgical duration, African ethnicity, and multiple intubation attempts.

Doerrfuss et al. [11] in 2019 studied frequency, predictors and therapeutic approaches for emergence agitation in paediatric population. PAED scale was used to diagnose delirium. It was concluded in their study that young age, lower ASA physical status and surgery in the area of head and throat are associated with incidence of delirium. Pharmacological measures

including clonidine or propofol were required in one quarter of the patients who developed delirium.

A prospective, randomised, single-blind, clinical trial including 80 patients performed by Jo et al. [38] in 2019 undergoing open rhinoplasty, septoplasty, turbinoplasty, endoscopic sinus surgery, and functional endoscopic sinus surgery under general anaesthesia who were randomised to receive total intravenous anaesthesia (TIVA) or volatile induction and maintenance of anaesthesia (VIMA). The incidence of emergence agitation was defined by a RASS score of at least 1 and a Riker Sedation-Agitation Scale score of at least 5 immediately after extubation. It was concluded that occurrence of emergence agitation after nasal surgery under general anaesthesia can be significantly reduced by using TIVA rather than VIMA.(2.5% in TIVA v/s 20% in VIMA).

Menser et al. [4] in 2020 discussed epidemiology of emergence delirium and agitation in the paediatric population and described the potential long-term consequences of emergence delirium in infants and children.

Nasal packing is commonly done in nasal surgeries postoperatively to achieve hemostasis, prevent adhesions and to keep the operated nasal structures in place. DiKiCi et al. [15] in 2020 studied the effect of nasal packing on patient comfort and healing after nasal surgery. The study included 97 patients who received three different types of nasal packs. Patient comfort and healing was studied after the packs were removed using a “Nasal Packing Survey”. This survey included various items like feeling of panic, bleeding after removal, headache, nose ache, sneezing among others.

In 2020 Babu et al. [39] proposed an alternative to postoperative nasal packing to increase patients comfort. It was determined that employing

Merocel in conjunction with an infant feeding tube can serve as an effective substitute for nasal splints. This method not only decreases nasal fullness and epistaxis but also helps in easier respiration.

In their 2021 meta-analysis, Wei et al. [7] in 2021 identified major risk factors associated with emergence agitation in adults. These included smoking, male gender, urinary catheter, post-operative pain, history of substance misuse, inhalational anaesthesia and intraoperative use of benzodiazepines.

In 2021 Lone et al. [40] evaluated various types of postoperative complications in patients undergoing maxillofacial surgeries under general anaesthesia. More complications were observed among females than in males. Common complications included sore throat, dysphagia, pain and vomiting. Patients who had other comorbidities also experienced hypertension and delayed wound healing in the postoperative period.

In a narrative review published in 2021 Tolly et al. [3] described a framework to differentiate EA from delirium. This review also provided a comprehensive overview of current understanding regarding EA risk factors, mechanisms, and management strategies in adults. Use of dexmedetomidine, ketamine, BIS for depth of anaesthesia, multimodal analgesia, and non pharmacological measures including preoperative rassurance etc are discussed for the management of EA.

In 2022, Zhang et al. [20] performed a randomised controlled trial among children undergoing otorhinolaryngologic surgeries to study the effect of preoperative breathing training based on video learning, on emergence delirium. The study concluded that preoperative respiratory training significantly decreased the occurrence of emergence delirium in children. However, as adults were not included in this study, the results cannot be

generalised and separate study is required to see its effect on adult emergence agitation.

Shi et al. [41] in 2022 investigated the potential long-term behavioural impacts of general anaesthesia on children. They found that three months after the procedure, there were no significant behavioural changes observed, except for a slight decrease in internalising problems.

Bhiwal et al. [42] in 2023 performed a prospective observational study aimed at identifying the incidence and risk factors associated with emergence agitation following nasal surgeries. The study included 68 adult patients with ASA physical status I-III. The incidence of emergence agitation in their research cohort was reported to be 27.5%. EA was found to be significantly associated with preoperative anxiety, postoperative pain, male gender, use of benzodiazepines in premedication, ASA physical status and hypertension. It was also observed that the incidence of complications like cough, desaturation, laryngospasm, breath holding and nasal bleeding were more common in patients who developed EA.

Almajali et al. [43] in 2023 investigated the effect of intramuscular ketamine on emergence agitation in 160 adults undergoing septoplasty and open septorhinoplasty under general anaesthesia. Towards the end of surgery, when the inhalational agent was turned off, patients in the Ketamine group (Group K) were administered 2 ml of saline containing 0.7mg/kg Ketamine intramuscularly and the control group (Group S) received 2 ml of plain normal saline. Richmond agitation sedation scale was used, and RASS score of 2 or more was considered to be positive for EA. Incidence of emergence agitation was significantly reduced in the Ketamine group. Although the time taken to obtain a verbal response to a verbal stimulus was more in group K, the postoperative pain scores were significantly lower.

Bang et al. [44] in 2023 used simulated education as a preoperative technique to look for postoperative opioid requirement, emergence agitation, pain scores and quality of recovery. Patients in the study group were trained to breathe through their mouth one day prior to surgery and were explained about the inevitable nasal discomfort and obstruction after nasal surgery. No significant impact was found on any of the outcomes.

In 2023, Xu et al. [13] conducted a randomised controlled trial aimed at assessing the effectiveness of preconditioning through nasal splinting and mouth breathing training in preventing delirium. 182 patients aged 18-82 years undergoing endoscopic sinus surgery were divided into preconditioning (Group P) and control (Group C) groups. Patients in group P received nasal splinting and mouth breathing training one hour before surgery. Their findings revealed a significant decrease in the occurrence of Emergence Agitation in group P. Furthermore, they identified male gender, smoking and Functional endoscopic Sinus Surgery as independent risk factors for emergence agitation.

MATERIALS AND METHODS

SOURCE OF DATA

This study was a randomised controlled trial, comprising a control group and a study group. A total of 90 patients of either sex scheduled for elective nasal surgery (septoplasty and rhinoplasty with or without osteotomies, endoscopic nasal surgery) under general anaesthesia were enrolled in the study. Approval was obtained from the Institutional Ethics Committee (IEC) for the same. Patients were randomly divided into 2 groups; Group C and Group S.

Group C- Control group

Group S- Study group (The group receiving preoperative nasal packing)

Written and informed consent were obtained from all patients.

METHOD OF COLLECTION OF DATA

- **Inclusion Criterion**
  1. Patients undergoing elective nasal surgeries
  2. Age between 18 to 60 years
  3. American Society of Anaesthesiologists Classification (ASA) Class I–II.

- **Exclusion Criterion**
  1. ASA grade III-VI
  2. Emergency cases
  3. History of mental illness.
  4. History of sedative or antipsychotic drug use (neuroinhibitors, anxiolytics, antidepressants, benzodiazepines) for any reason.
  5. History of neurological diseases (cerebral infarction, transient ischaemic attack, Parkinson’s disease, mental retardation, cranio-cerebral injury).

6. Concurrent neuromuscular blockade or quadriplegia
7. Patients with Mucormycosis or any fungal infection involving nasal cavity and orbit.
8. Refusal to participate in study or unable to tolerate nasal packing.

During pre-anaesthetic check up, patients in both groups were informed about nasal packing which would be in situ postoperatively and counselled to breathe by mouth during that period.

In the patients of the study group after counselling, bilateral nasal packing was done with saline soaked merocel by an ENT resident, 12 hours prior to surgery. It was ensured that patients did not breathe through the nose, and hence breathed entirely through the mouth. The control group patients did not undergo any intervention.

In both groups, oxymetazoline nasal drops were put every 2 hours, starting 12 hours prior to surgery for the purpose of decongestion. Patients' vitals including heart rate, blood pressure and SpO_2 were monitored overnight at 4 hour intervals by the nursing staff on duty.

Patient tolerance was assessed using the following score at 2 hours after nasal packing and just prior to shifting the patient to OR. [15] Patients unable to tolerate nasal packing had it removed and were subsequently excluded from the study.

Nasal Packing Survey items

	Not a problem	Very mild problem	Moderate problem	Fairly bad problem	Severe problem
Headache	0	1	2	3	4
Nose Ache	0	1	2	3	4
Ear ache	0	1	2	3	4
Sneezing	0	1	2	3	4
Difficulty Sleeping	0	1	2	3	4

After shifting the patients to OR, monitors were attached to record vitals. Preoxygenation was done using 100% oxygen for 3 minutes. After recording preoperative vitals patients were premedicated with Inj. midazolam 0.1mg/kg, Inj. dexamethasone 0.1-0.2mg/kg and Inj. glycopyrrolate 0.005-0.01mg/kg i.v. General anaesthesia was induced by combined use of fentanyl 1-2mcg/kg and propofol 1.5–2 mg/kg intravenously until the loss of eyelash reflex. Muscle relaxation was achieved by Inj. atracurium 0.5 mg/kg i.v. and oxygenation was continued for 3 minutes. Orotracheal intubation was performed using a 7.5mm and 8.5mm tracheal tube for women and men, respectively. To reduce the amount of bleeding, all patients were laid in an approx. 30° reverse trendelenburg position. Once the patient was intubated, the surgeon instilled 1 in 10 Adrenaline drops into the nasal packing in the study group. In the control group cotton gauze/patty soaked with 1 in 10 adrenaline was put into both nares. This packing was removed after 5 minutes and surgery was started. Monitoring with electrocardiography, pulse oximetry, non-invasive BP and capnography was done every 5 minutes. [43]

Maintenance of anaesthesia was sustained with sevoflurane 2-4%, nitrous oxide 50% and oxygen 50% to keep the BIS in the 40-60 range. Mechanical ventilation was continued to provide an end-tidal carbon dioxide level of 32-36 mmHg. [18] Inj. Atracurium in the dose range of 0.08-0.1mg/kg was used to maintain muscle relaxation. MAP was maintained between 60-65 mm Hg using 10mg i.v. incremental doses of Inj. Esmolol. Inj. Paracetamol 1gm i.v. was given 30 minutes prior to extubation for the purpose of analgesia and injection ondansetron 4 mg was given around the same time, for postoperative nausea and vomiting. Volatile anaesthetic was turned off just before the beginning of nasal packing. Once the surgery was complete, flows of nitrous oxide and oxygen were increased to remove the residual volatile anaesthetic from the circuit. VCV mode of mechanical ventilation was turned into PCV, oral suction was performed, and patients were reversed with glycopyrrolate 0.004 mg/kg and neostigmine 0.02 mg/kg intravenously.

Extubation was done by the same consultant in all cases, at the return of spontaneous ventilation with Bispectral index >80. It was considered a smooth extubation when there were no gross purposeful movements during extubation. If the patients developed laryngospasm or breath holding spell immediately after extubation, they were considered as not being extubated smoothly. Complications such as breath holding, laryngospasm and desaturation were noted. Patients were given oxygen at 6 litres/min via face mask. Airway adequacy was evaluated with the help of SpO2 values, auscultation, observation of chest movements and analysis of EtCO2 waveform with sampling cannula positioned inside the facemask. [44] Coughing and other respiratory complications were also recorded**.**

RASS score was measured immediately after extubation and in patients with emergence agitation, duration and intensity of emergence agitation was also noted. [1,6] The highest RASS scores of the patients was recorded, and patients with a Richmond Agitation–Sedation Scale score of ≥+1 at any time was considered as having EA. RASS≥+3 was considered dangerous agitation and Inj. Midazolam 1 mg i.v. was given for the same. When the RASS score became zero (i.e. the patient was alert and calm), this was considered as the end point of emergence agitation. If physical restraining was required in severe cases, it was also recorded. [45]

RICHMOND AGITATION SEDATION SCALE (RASS)

SCORE	TERM	DESCRIPTION
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent nonpurposeful movement, fights ventilator
+1	Restless	Anxious but movements not aggressive or vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (>10 seconds)
-2	Light Sedation	Briefly awakens with eye contact to voice (<10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)
-4	Deep Sedation	Movement or eye opening to voice (but no eye contact)
-5	Unarousable	No response to voice or physical stimulation

A nasal packing survey for grading patients' tolerance was also performed postoperatively in PACU in both the groups before discharge to compare the tolerance.

Outcomes:

- **Primary outcome:**

Effect of preconditioning with nasal packing on Emergence agitation.

- **Secondary outcomes:**

1) Intensity and duration of emergence agitation.
2) Effect of nasal packing both preoperatively and postoperatively on patient satisfaction & comfort.

Number of Cases

SAMPLE SIZE CALCULATION

By using previous study by Kim HJ et al [14], it was observed that the incidence of emergence agitation was 22.2% in group C and 1% in group S. Taking these values as reference, the minimum required sample size with 90% power of the study and 5% level of significance is 45 patients in each study group.

The formula used in the situation is as under:

$$n = \frac{[Z_{1-\alpha/2}\sqrt{2P(1-P)} + Z_{1-\beta}.\sqrt{\{P1(1-P1) + P2(1-P2)\}}]^2}{(P1-P2)^2}$$

Where $P = (P1+P2)/2$

• Approximate value of efficacy/cure rate for standard treatment =P1

• Approximate value of efficacy/cure rate for other treatment = P2

• Effect size = (P2-P1)

• Level of significance (usually 5%)

Zα = Value of standard normal variate corresponding to α level of significance (1.96) and Zβ = The standard normal deviate for desired power (1.282)

STATISTICAL ANALYSIS

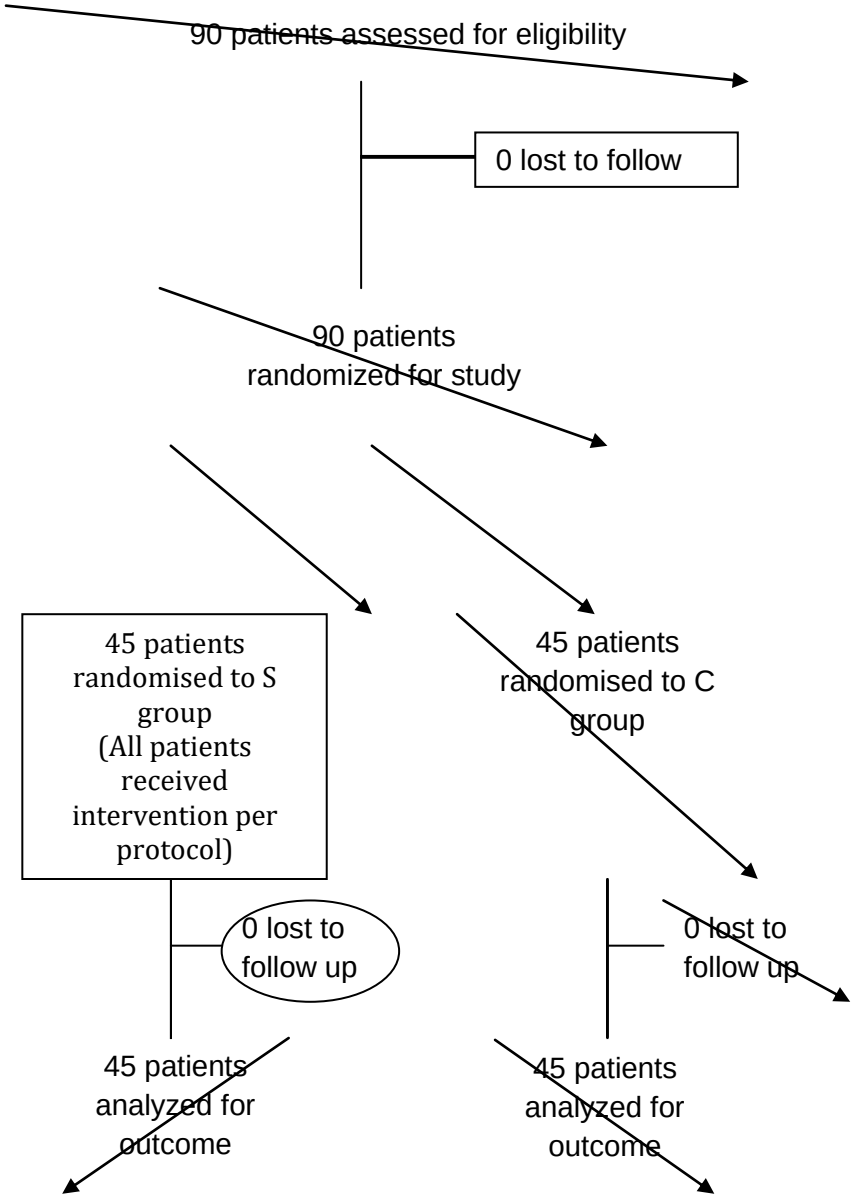
Data was described in terms of range; mean ± standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. To determine whether the data was normally distributed, a Kolmogorov-Smirnov test was used.

Comparison of quantitative variables between the study groups was done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test was performed and

Fisher exact test was used when the expected frequency is less than 5.

A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21 version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

OBSERVATION AND RESULTS


90 patients assessed for eligibility
0 lost to follow
90 patients randomized for study
45 patients randomised to S group (All patients received intervention per protocol)
45 patients randomised to C group
0 lost to follow up
0 lost to follow up
45 patients analyzed for outcome
45 patients analyzed for outcome

1. **Demographic data:**

90 patients aged 18-60 years, of either sex, belonging to ASA Physical status I/II, scheduled for elective nasal surgery were enrolled in the study. They were randomly allocated into 2 groups of 45 patients each.

Group C: The control group, no preoperative nasal packing was done prior to elective nasal surgery.

Group S: The study group received bilateral nasal packing 12 hours prior to surgery. The tolerance for nasal packing was also studied in group S overnight.

1.1 Age & Sex: The mean age in Group C was 29.49±10.03 years and in Group S was a 32.87±9.61 year with a p-value of 0.052. There were 9 (20%) females and 36 (80%) males in group C and 8 (17.8%) females and 37 (82.2%) males in group S. Both the groups were comparable with respect to sex, i.e. p-value of 0.788. (Table 1a) (Figure 1, 2).

Table 1a: Distribution of AGE & SEX

		Group C		Group S		Chi-square value/ Z	p-value
Age (in years)		29.49	10.03	32.87	9.61	-1.939	0.052
Sex (F=female M=male)	F	9	20.0%	8	17.8%	0.073	0.788
	M	36	80.0%	37	82.2 %		

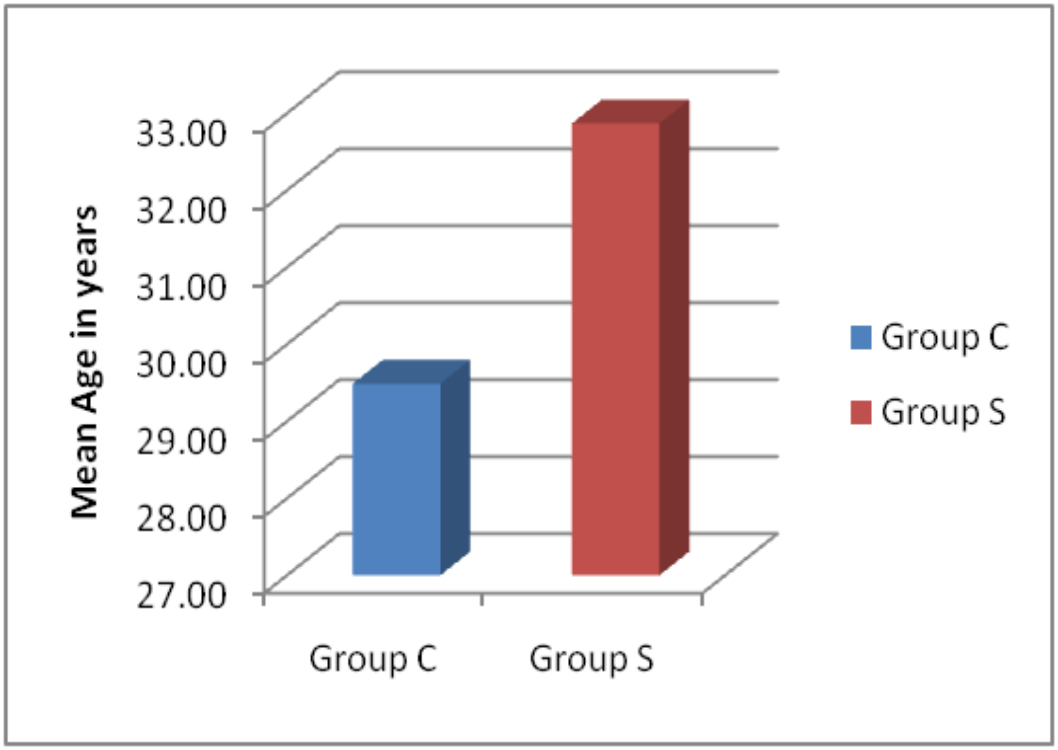


Figure 1: Mean Age in Group C & Group S

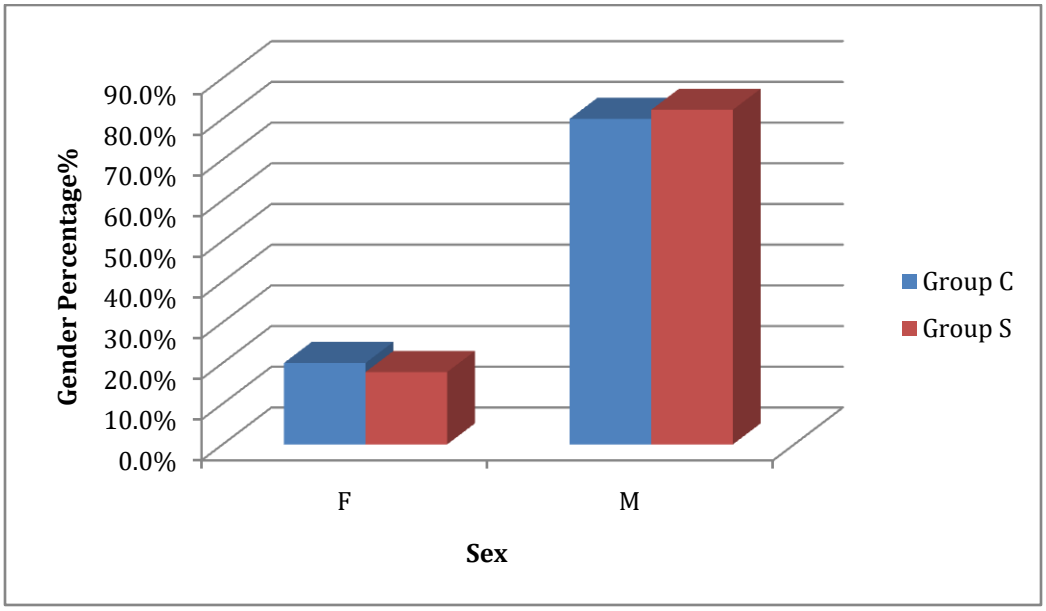


Figure 2: Distribution of sex (F=Female, M=Male)

1.2 ASA Grade: 33 (73.3%) patients in group C belonged to ASA Grade I and 12 (26.7%) patients belonged to ASA Grade II. In group S, 32 (71.1%) patients belonged to ASA Grade I and 13 (28.9%) patients belonged to ASA Grade II (p-value=0.814).(Table 1b) (Figure 3)

Table 1b: Distribution of ASA Grade

		Group C		Group S		Chi-square value/ Z	p-value
ASA	I	33	73.3%	32	71.1%	0.055	0.814
	II	12	26.7%	13	28.9%		

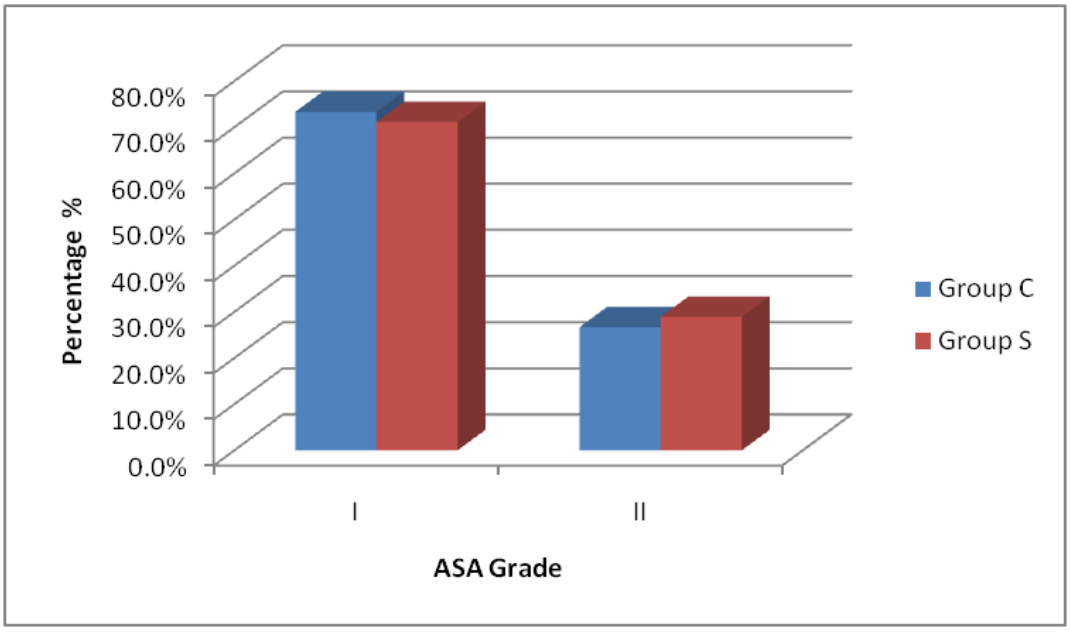


Figure 3: ASA grading in Group C & Group S

1.3 BMI: The mean body mass index was 24.80±4.68 in group C and 25.74±2.94 in group S with a p-value of 0.774.(Table 1c) (Figure 4)

Table 1c: Body Mass Index

	Group C		Group S		Chi-square value/Z	p-value
BMI	24.80	4.68	25.74	2.94	-0.288	0.774

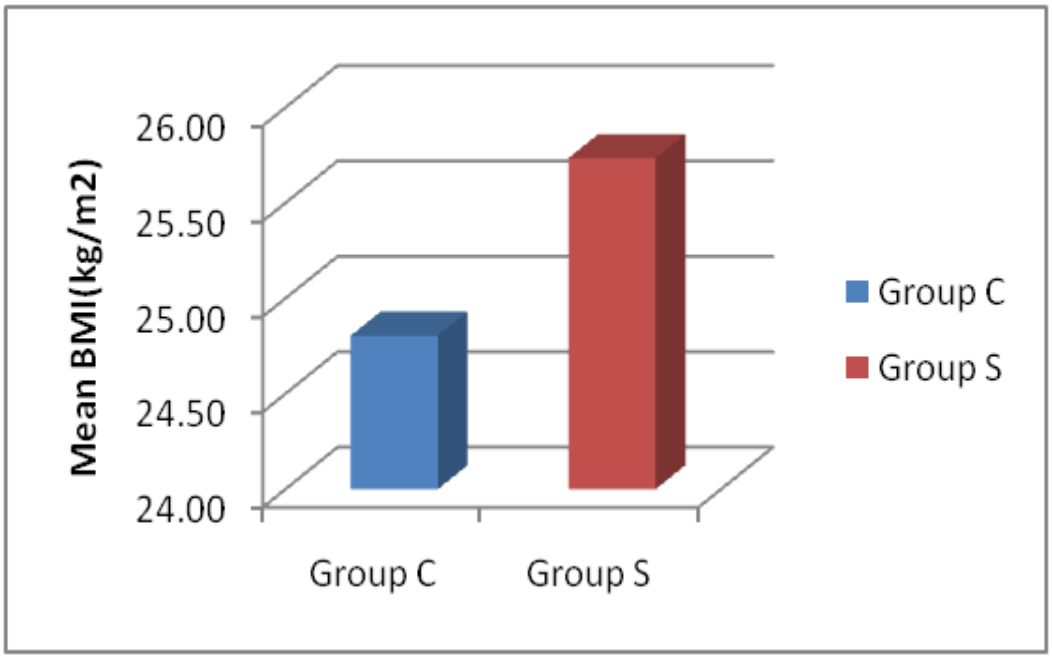


Figure 4: Mean BMI in kg/m^2

1.4 Comorbidities: In group S 4(8.9%) patients were hypertensive, 3 (6.7%)patients were obese, 1(2.2%) patient was diabetic, 1(2.2%) had asthma,1(2.2%) had COPD, 1(2.2%) had hypothyroidism and 1(2.2%) was HCV positive. In group C 8(17.8%) were hypertensive, 2 patients were obese class I and 2 were obese class II. Both groups were comparable with a p-value of 0.388. (Table 1d) (Figure 5)

Table 1d: Distribution of Comorbidities

		Group C		Group S		Chi-square value/ Z	p-value
Comorbidities	Asthma	0	0.0%	1	2.2%	9.549	0.388
	COPD	0	0.0%	1	2.2%		
	HCV positive	0	0.0%	1	2.2%		
	Hypertension	8	17.8%	4	8.9%		
	Hypothyroidism	0	0.0%	1	2.2%		
	None	33	73.3%	32	71.1%		
	Obese I	2	4.4%	3	6.7%		
	Obese II	2	4.4%	0	0.0%		
	T2DM	0	0.0%	1	2.2%		
	Vertigo, orthostatic hypotension	0	0.0%	1	2.2%		

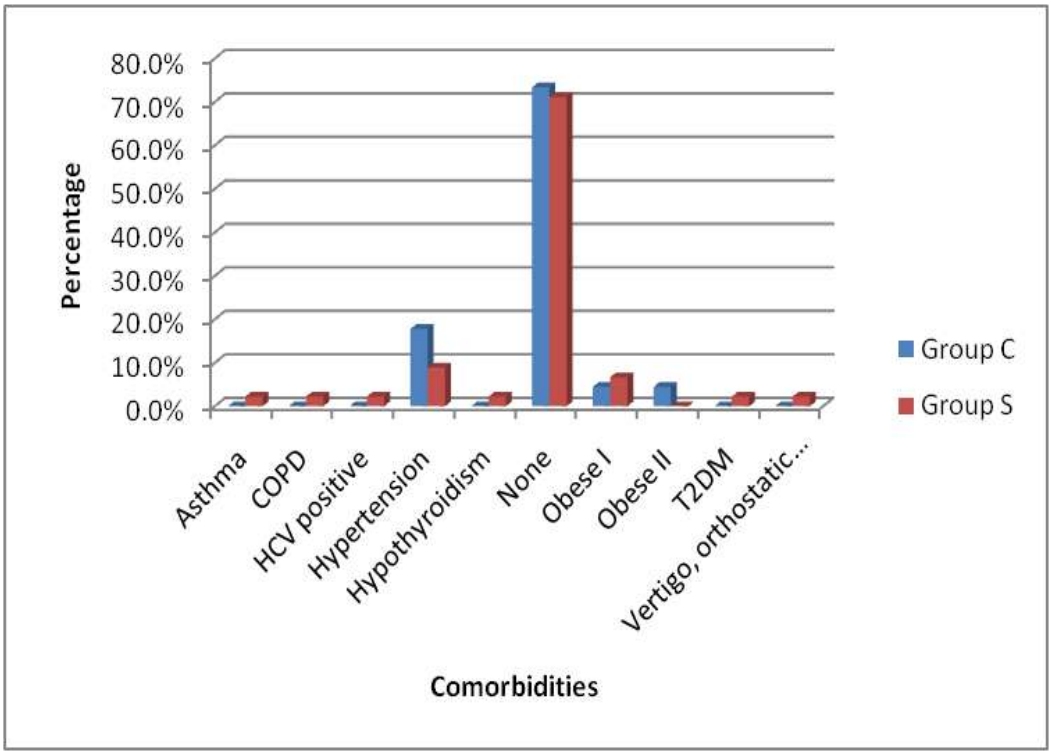


Figure 5: Distribution of comorbidities among group C and S.

2. Nasal Blockade

41 (91.1%) patients in group C and 42 (93.3%) patients in group S presented with nasal blockade as a chief complaint with a p-value of 0.694. (Table 2a) (Figure 6).

In group C, 3(6.7%) patients had bilateral complete nasal blockade, 18 (40%) had bilateral partial nasal blockade, 4 (8.9%) had unilateral complete nasal blockade and 16 (35.6%) had unilateral partial nasal blockade. In group S, 2 (4.4%) had bilateral complete nasal blockade, 23(51.1%) had bilateral partial nasal blockade, 9 (20.0%) had unilateral complete nasal blockade and 8 (17.8%) had unilateral partial nasal blockade. (Table 2b) (Figure 7)

Table 2a: Incidence of nasal blockade

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Nasal Blockade	N	4	8.9%	3	6.7%	7	0.155	0.694
	Y	41	91.1%	42	93.3 %	83		
Total		45	100.0%	45	100.0 %	90		

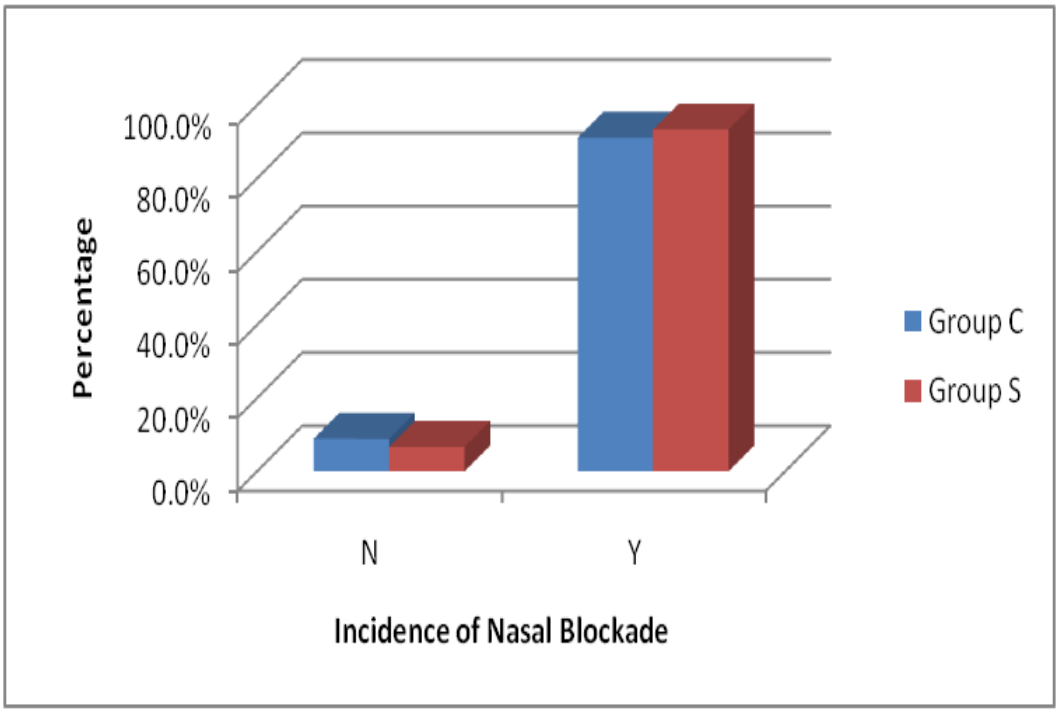


Figure 6: Incidence of nasal blockade (N=No, Y=Yes)

Table 2b: Type of nasal blockade

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Type of nasal obstruction	Bilateral, Complete	3	6.7%	2	4.4%	5	7.619	0.179
	Bilateral, Partial	18	40.0%	23	51.1%	41		
	None	4	8.9%	3	6.7%	7		
	Unilateral, Complete	4	8.9%	8	17.8%	12		
	Unilateral, Partial	16	35.6%	9	20.0%	24		
Total		45	100.0%	45	100.0%	90		

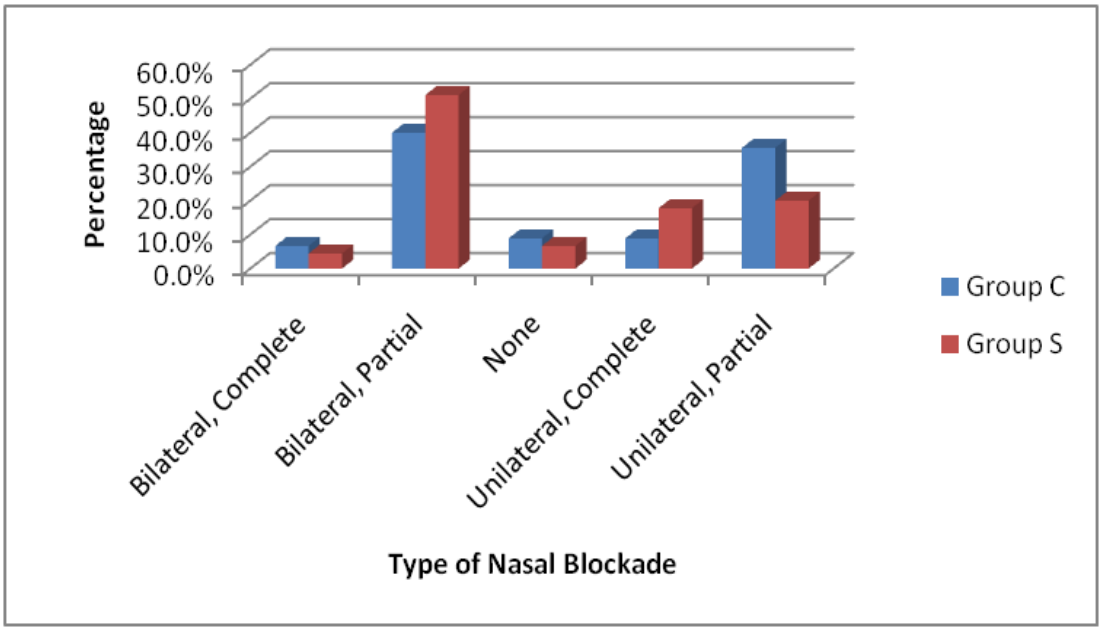


Figure 7: Type of nasal blockade

3. Type of Nasal Surgery

10 (22.2%) patients in the control group and 18(40.0%) patients in the study group underwent FESS. There was no statistically significant difference in the type of surgeries in both the groups.(Table 3) (Figure 8)

Table 3: Type of Nasal Surgery

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Type of Surgery	FESS	10	22.2%	18	40.0%	28	6.228	0.398
	FESS, Septoplasty	2	4.4%	4	8.9%	6		
	FESS, Septoturbinoplasty	9	20.0%	6	13.3%	15		
	Septoplasty	1	2.2%	0	0.0%	1		
	Septorhinoplasty	1	2.2%	1	2.2%	2		
	Septoturbinoplasty	21	46.7%	16	35.6%	37		
	Septoturbinoplasty + Adenoidectomy	1	2.2%	0	0.0%	1		
Total		45	100.0%	45	100.0%	90		

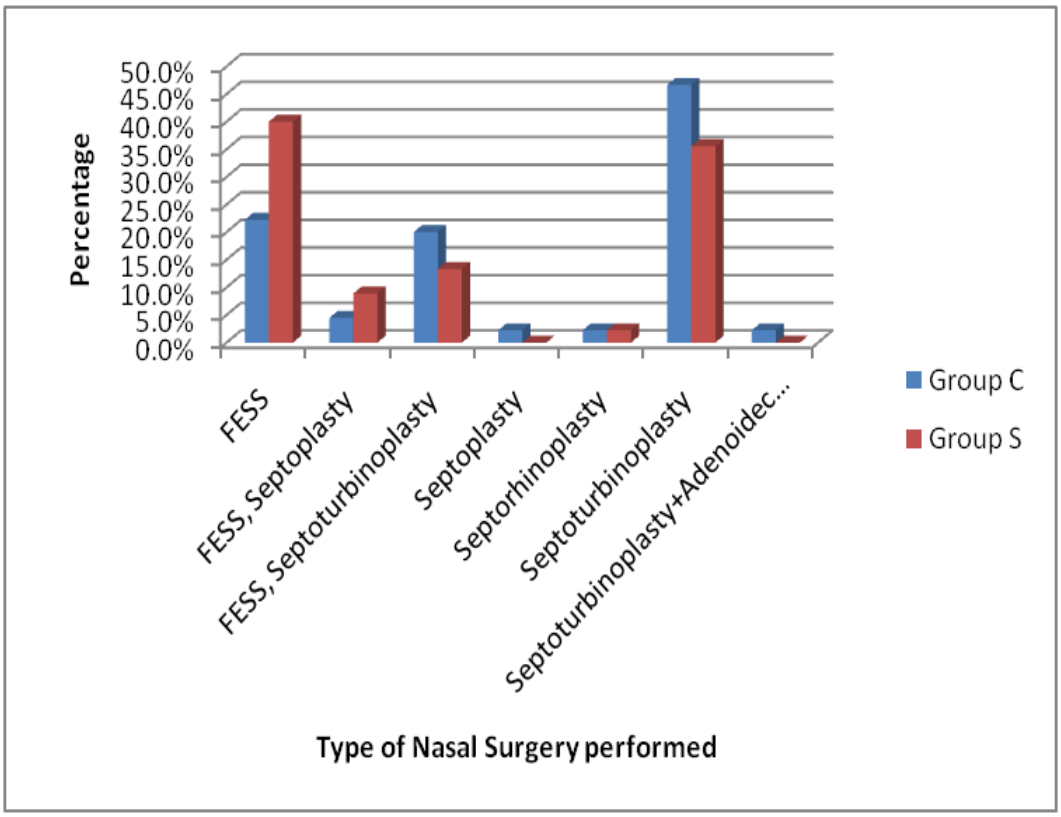


Figure 8: Types of Nasal Surgeries performed

4. Nasal Packing and Tolerance

In group S preoperative tolerance for nasal packing was studied 2 hours after nasal packing and just before shifting to the OR.

In order to study the tolerance, a tolerance score was defined with the nasal packing survey that included headache, nose ache, earache, sneezing and difficulty sleeping as its parameters. Tolerance score was studied 3 times i.e.at 2 hours after packing, just before shifting to the OR and post-operatively(Tables 4a, 4b, 4c) (Figures 9,10,11). In group C Tolerance score was studied post-operatively. (Table 4c)

Table 4a: Preoperative Nasal Packing Tolerance Score in Group S (2 hours after packing)

		Group S		Total
	Score	No. of cases	%age	
Pre-op Headache (2hr after packing)	0	44	97.8%	44
	1	1	2.2%	1
Pre-op Nose ache (2hr after packing)	0	41	91.1%	41
	1	3	6.7%	3
	2	1	2.2%	1
Pre-op Ear ache 2 hr after packing	0	45	100.0%	45
Pre-op Sneezing 2 hr after packing	0	43	95.6%	43
	1	1	2.2%	1
	2	1	2.2%	1
Pre-op Difficulty sleeping 2 hr after packing	0	42	93.3%	42
	1	1	2.2%	1
	2	2	4.4%	2

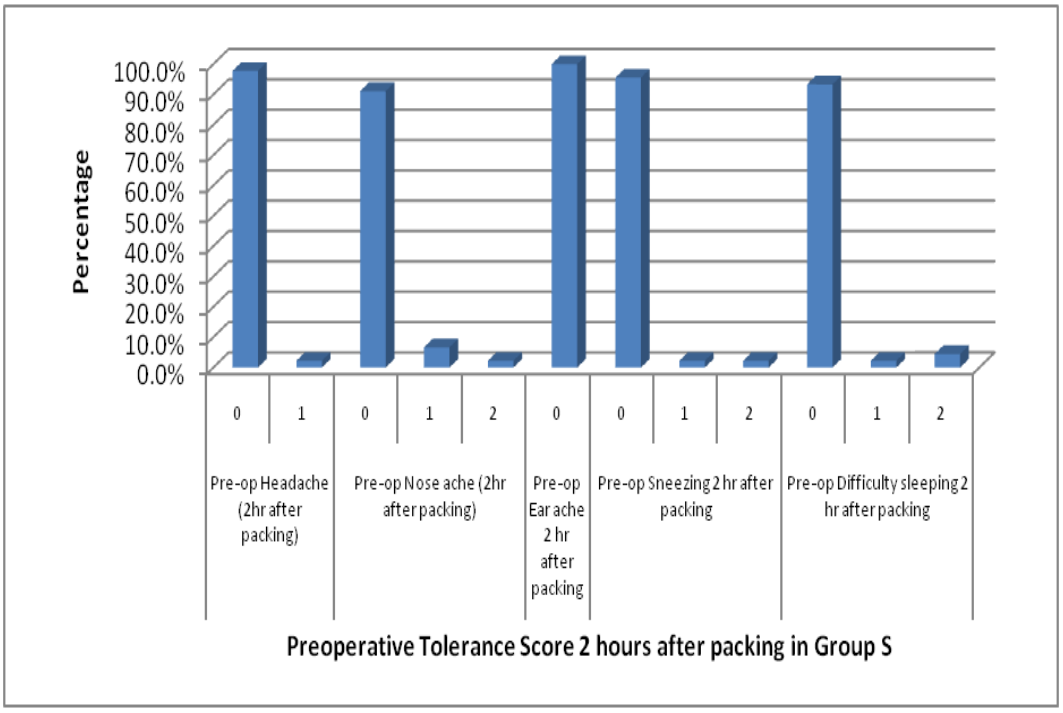


Figure 9: Preoperative Tolerance Score in Group S, 2 hours after packing

Table 4b: Preoperative Nasal Packing Tolerance score in Group S (before shifting to OR)

		Group S		Total
		No. of cases	%age	
Pre-op Headache before shifting to OR	0	44	97.8%	44
	1	1	2.2%	1
Pre-op Nose ache before shifting to OR	0	41	91.1%	41
	1	4	8.9%	4
Pre-op ear ache before shifting to OR	0	45	100.0%	45
Pre-op Sneezing before shifting to OR	0	44	97.8%	44
	1	1	2.2%	1
Pre-op difficulty sleeping before shifting to Or	0	42	93.3%	42
	1	2	4.4%	2
	2	1	2.2%	1

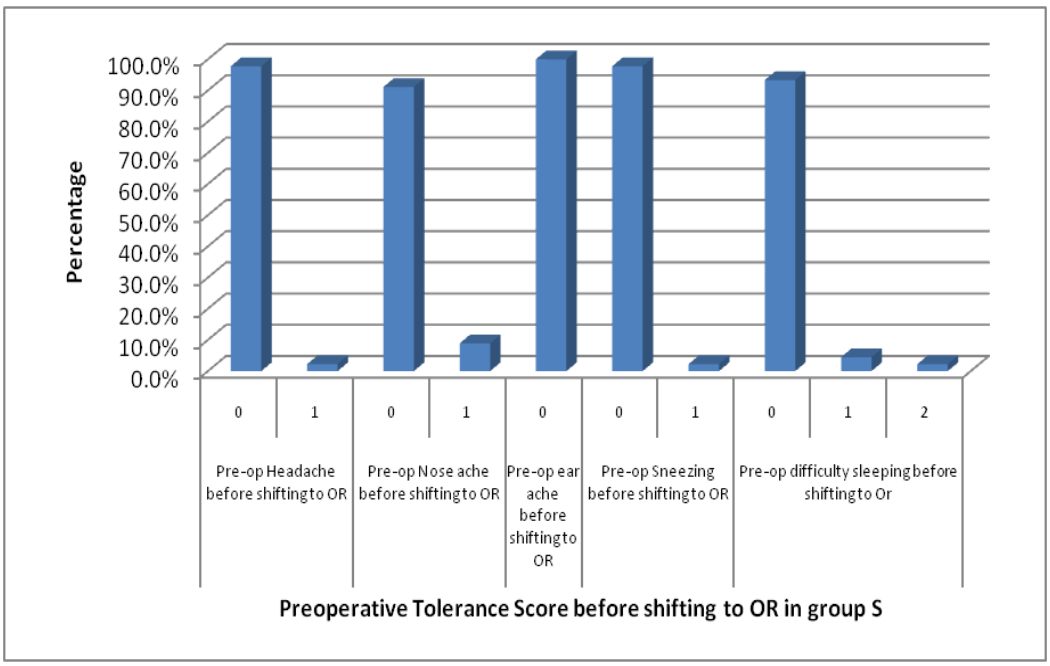


Figure 10: Preoperative Tolerance Score in Group S just before shifting to OR

Post-operative tolerance score was compared in both the groups. Incidence of postoperative headache was 24.4% (n=11) in group C and 6.6% (n=3) in group S (p-value=0.046). Incidence of postoperative nose ache was 86.7% (n= 39) in group C and 55.4% (n=25) in group S (p-value=0.004). There was 0% incidence of earache in both the groups. Incidence of sneezing was 4.4% (n=2) in group C and 0% in group S. Incidence of postoperative difficulty sleeping was 31.1% (n=14) in group C and 4.4% (n=2) in group S (p-value=0.002). (Table 5c) (Figure 11)

Table 4c: Postoperative Tolerance Score

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Post-op Headache	0	34	75.6%	42	93.3%	76	6.175	0.046
	1	10	22.2%	2	4.4%	12		
	2	1	2.2%	1	2.2%	2		
Post-op Nose ache	0	6	13.3%	20	44.4%	26	13.394	0.004
	1	19	42.2%	15	33.3%	34		
	2	16	35.6%	10	22.2%	26		
	3	4	8.9%	0	0.0%	4		
Post-op ear ache	0	45	100.0%	45	100.0%	90		
Post-op Sneezing	0	43	95.6%	45	100.0%	88	2.045	0.494
	1	2	4.4%	0	0.0%	2		
Post-op Difficulty sleeping	0	31	68.9%	43	95.6%	74	10.946	0.002
	1	14	31.1%	2	4.4%	16		

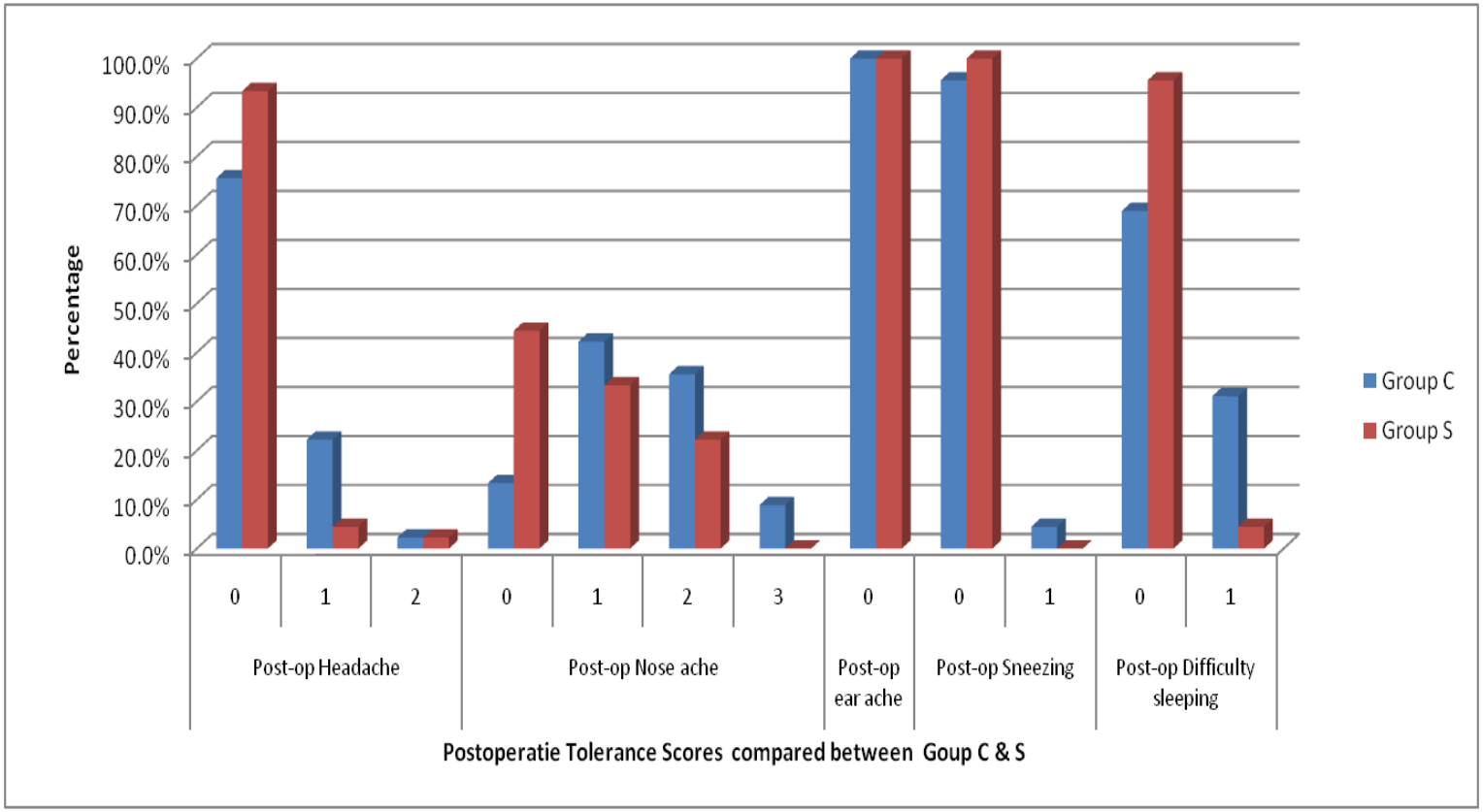


Figure 11: Postoperative Tolerance scores compared between Group C & S

5. Overnight hemodynamic parameters after packing

In group S hemodynamic parameters including Heart rate, Non-invasive Blood pressure and SpO_2 were studied overnight after nasal packing. There were no significant changes in the mean vital parameters.
(Tables 5a-5d) (Figures 12-15).

Table 5a: Mean Heart Rate (HR) overnight

	Group S
	Mean
HR (4hr after packing)	82.29
HR (6 hr after packing)	81.91
HR (8hr)	80.98
HR (10 hr)	79.56
HR (12hr)	81.36

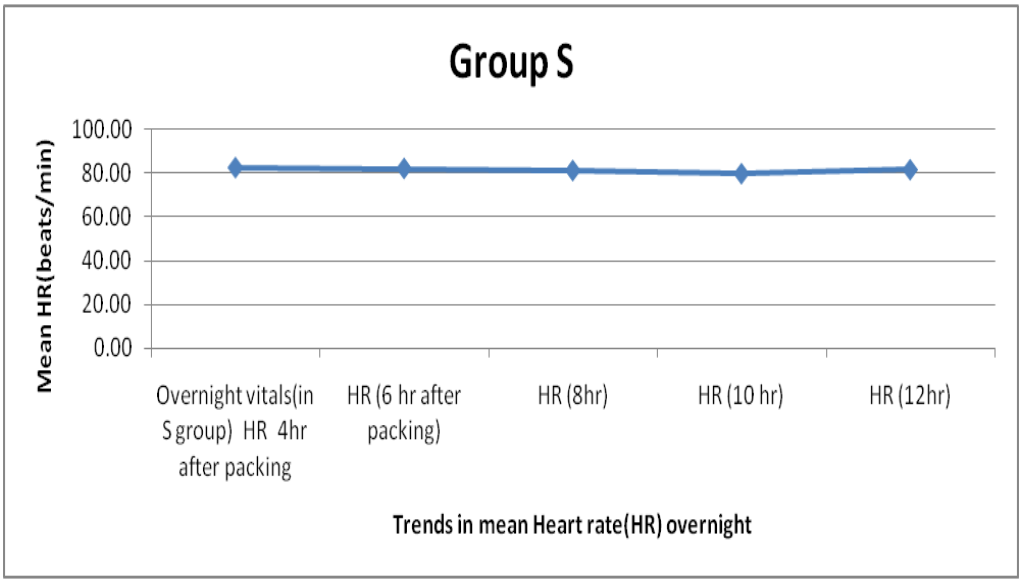


Figure 12: Trends in Mean Heart Rate (HR) overnight

Table 5b: Mean Systolic Blood Pressure (SBP) overnight:

	Group S
	Mean
SBP (4hr)	121.44
SBP (6hr)	120.67
SBP (8hr)	118.87
SBP (10hr)	118.13
SBP (12hr)	121.62

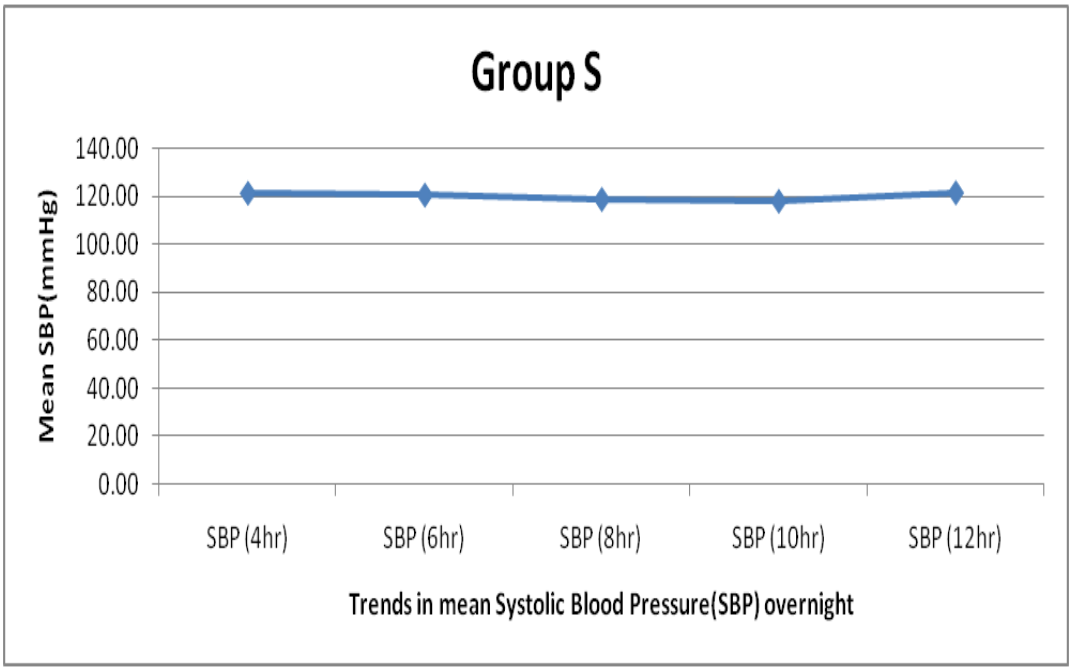


Figure 13: Trends in mean Systolic Blood Pressure (SBP) overnight

Table 5c: Mean Diastolic Blood Pressure (DBP) overnight:

	Group S
	Mean
DBP(4hr)	76.33
DBP(6hr)	75.04
DBP(8hr)	73.80
DBP(10hr)	74.20
DBP(12hr)	74.73

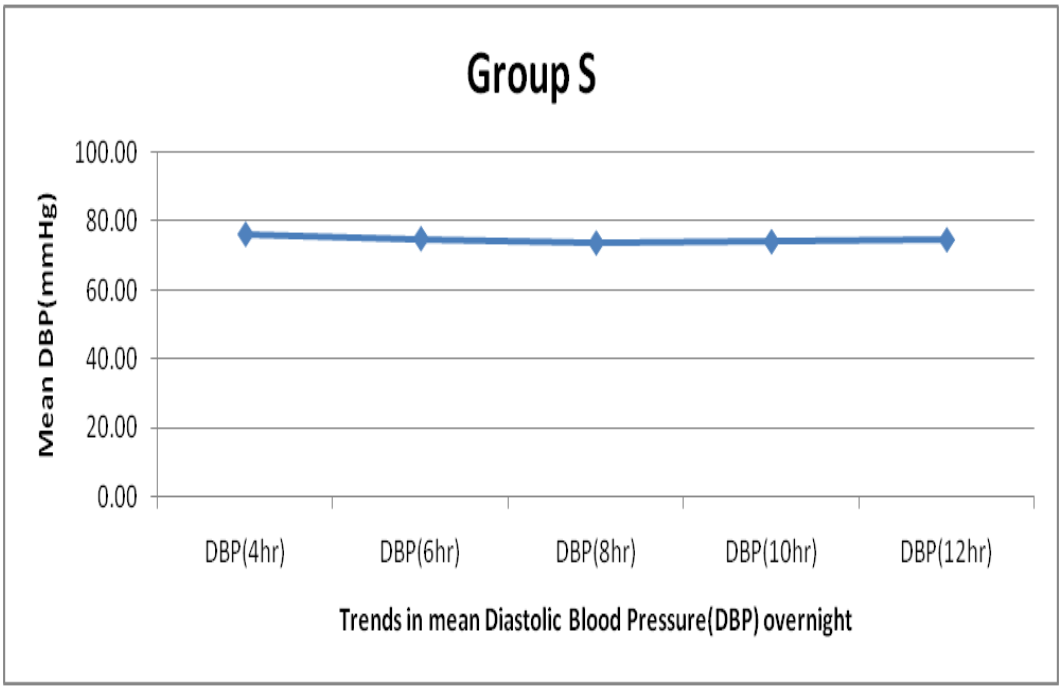


Figure 14: Trends in mean Diastolic Blood Pressure (DBP) overnight

Table 5d: Mean SpO_2 overnight:

	Group S
	Mean
SpO2 (4hr)	98.16
SpO2 (6hr)	97.96
SpO2 (8hr)	97.93
SpO2 (10hr)	98.02
SpO2 (12hr)	98.20

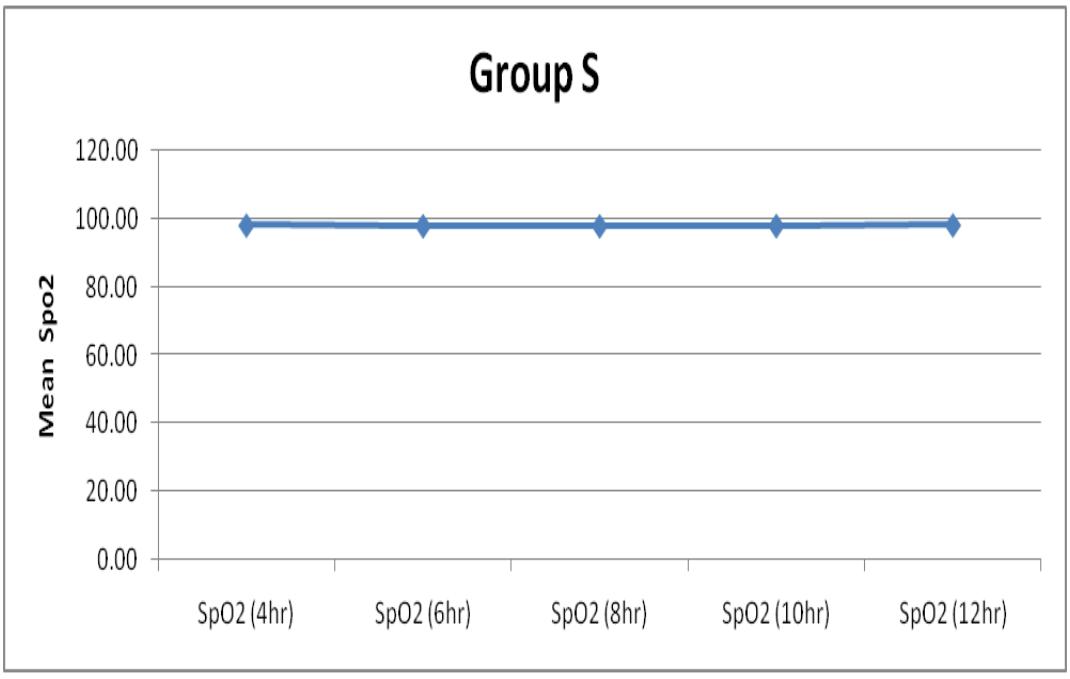


Figure 15: Trends in mean SpO_2 overnight

6. Intraoperative Hemodynamic Parameters

After shifting the patients to OR, baseline vitals were noted including heart rate(HR), oxygen saturation(SpO_2), systolic and diastolic blood pressure(SBP, DBP). After induction vitals monitoring including $EtCO_2$ was done at a 15 minutes interval. Vitals throughout the surgery are displayed with the help of line plots. (Tables 6a-e) (Figures 16-20). No statistically significant difference was found in intraoperative vitals between both the groups.

Table 6a: Trends in mean Heart Rate (HR):

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Baseline HR	82.62	10.90	85.18	9.78	-1.204	0.228
HR at 0 min	99.44	12.25	100.49	10.23	-1.003	0.316
HR at 15 min	97.60	12.75	95.47	12.35	-0.509	0.611
HR at 30 min	92.87	11.79	89.67	11.70	-1.070	0.285
HR at 45 min	90.69	11.38	89.09	12.26	-0.569	0.569
HR at 1 hr	90.31	11.20	87.24	11.62	-1.171	0.241
HR at 75 min	91.48	12.44	88.44	11.66	-1.071	0.284
HR at 90 min	91.27	10.83	88.61	12.01	-0.897	0.370
HR at 105 min	90.17	10.98	89.00	10.30	-0.267	0.789
HR at 2 hr	92.90	11.51	91.54	10.28	-0.308	0.758
HR at 2hr 15 min	97.00	12.59	93.53	10.91	-0.358	0.720
HR at 2hr 30min	96.29	15.39	93.75	11.17	-0.116	0.908
HR at 2hr 45min	93.75	16.74	94.50	6.86	-0.289	0.773
HR at 3hr	94.25	7.59	104.67	9.87	-1.414	0.157
HR at 3hr 15min	102.00	8.49	118.00	.	-1.225	0.221
HR at 3hr 30min	101.00	.	120.00	.	-1.000	0.317
HR at 3hr 45min	98.00	.	.	.		
HR at 4hr	94.00	.	.	.		
HR at 4hr 15min	92.00	.	.	.		
HR at 4hr 30min	94.00	.	.	.		
HR at 4hr 45min	92.00	.	.	.		

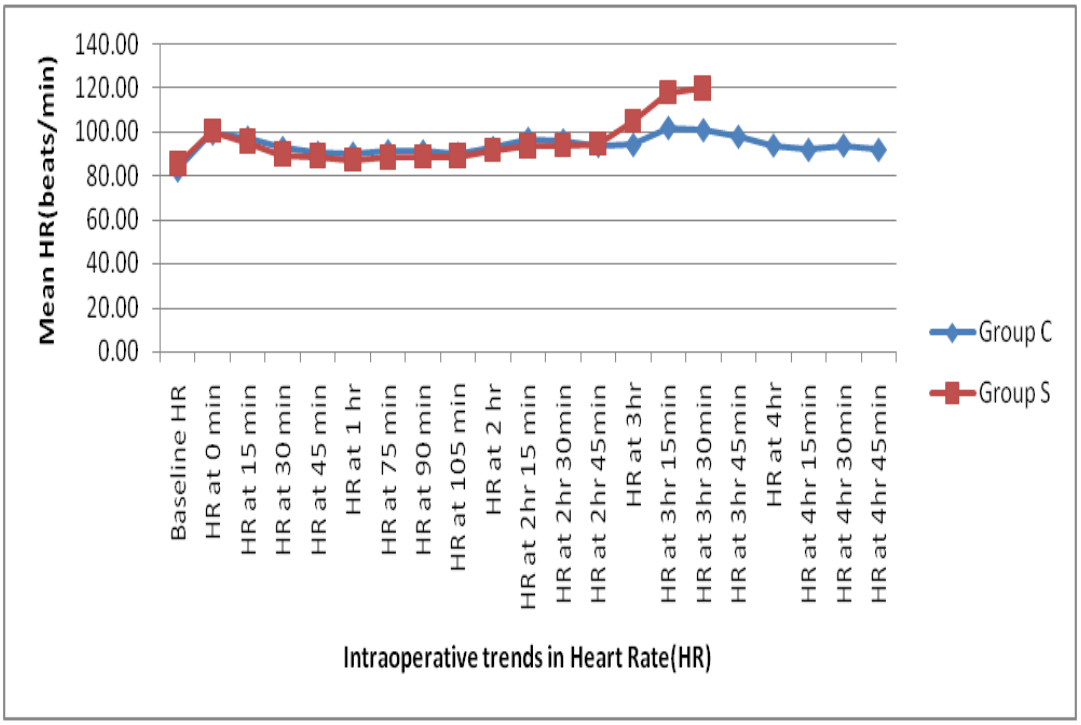


Figure 16: Trends in Mean Heart Rate (HR)

Table 6b: Trends in Mean SpO_2:

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Baseline SpO2	98.73	0.89	98.60	1.07	-0.379	0.704
SpO2 at 0 min	99.82	0.39	99.73	0.50	-0.815	0.415
SpO2 at 15 min	99.33	0.74	99.20	0.87	-0.600	0.548
SpO2 at 30 min	99.11	0.83	98.91	0.95	-0.991	0.321
SpO2 at 45 min	98.87	0.94	98.84	1.04	-0.078	0.938
SpO2 at 1hr	98.84	1.07	98.98	1.06	-0.745	0.456
SpO2 at 75 min	98.74	0.96	98.51	0.99	-1.109	0.267
SpO2 at 90 min	98.81	1.02	98.63	1.15	-0.399	0.690
SpO2 at 105 min	98.87	1.01	98.47	1.16	-1.376	0.169
SpO2 at 2hr	98.64	1.09	98.88	0.90	-0.695	0.487
SpO2 at 2hr 15min	99.11	0.78	98.81	0.98	-0.662	0.508
SpO2 at 2hr 30min	99.14	0.69	98.86	0.38	0.961	0.356
SpO2 at 2hr 45min	99.00	0.82	98.67	0.58	-0.592	0.554
SpO2 at 3hr	99.00	0.82	99.00	1.00	0.000	1.000
SpO2 at 3hr 15min	99.00	0.00	99.00	.	0.000	1.000
SpO2 at 3hr 30min	99.00	.	98.00	.	-1.000	0.317
SpO2 at 3hr 45min	99.00	.		.		
SpO2 at 4hr	98.00	.		.		
SpO2 at 4hr 15min	99.00	.		.		
SpO2 at 4hr 30min	99.00	.		.		
SpO2 at 4hr 45min	99.00	.		.		

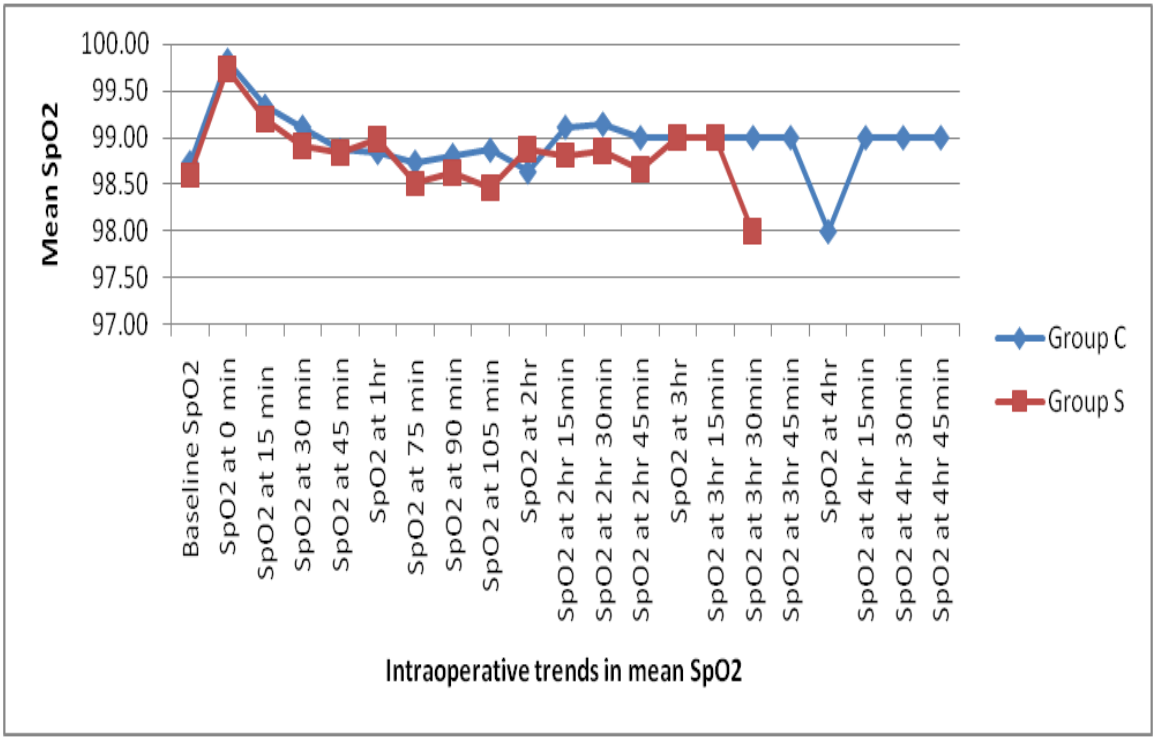


Figure 17: Trends in mean SpO_2

Table 6c: Trends in mean Systolic Blood Pressure (SBP):

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Baseline SBP	125.00	13.71	125.31	9.99	-0.623	0.533
SBP at 0 min	128.80	19.17	127.91	19.80	-0.307	0.759
SBP at 15 min	119.71	15.67	118.51	16.27	-0.246	0.805
SBP at 30 min	116.20	15.25	115.40	14.62	-0.097	0.923
SBP at 45 min	115.00	15.67	116.91	15.16	-0.682	0.495
SBP at 1hr	117.24	15.97	117.78	14.65	-0.061	0.952
SBP at 75 min	121.55	14.98	121.38	14.72	-0.111	0.912
SBP at 90 min	122.14	12.19	121.97	14.89	-0.401	0.689
SBP at 105 min	123.79	12.85	124.10	13.67	-0.052	0.959
SBP at 2hr	127.14	14.33	126.00	9.50	-0.273	0.785
SBP at 2hr 15min	123.88	21.56	128.07	10.69	-1.133	0.257
SBP at 2hr 30 min	124.71	17.26	128.14	10.46	-0.385	0.700
SBP at 2hr 45 min	126.50	22.55	130.67	1.15	-1.070	0.285
SBP at 3 hr	125.50	18.48	141.00	7.07	-0.926	0.355
SBP at 3hr 15 min	113.50	10.61	140.00	.	-1.225	0.221
SBP at 3hr 30 min	138.00	.	138.00	.	0.000	1.000
SBP at 3hr 45	126.00	.	.	.		
SBP at 4hr	104.00	.	.	.		
SBP at 4hr 15 min	102.00	.	.	.		
SBP at 4hr 30 min	100.00	.	.	.		
SBP at 4hr 45 min	98.00	.	.	.		

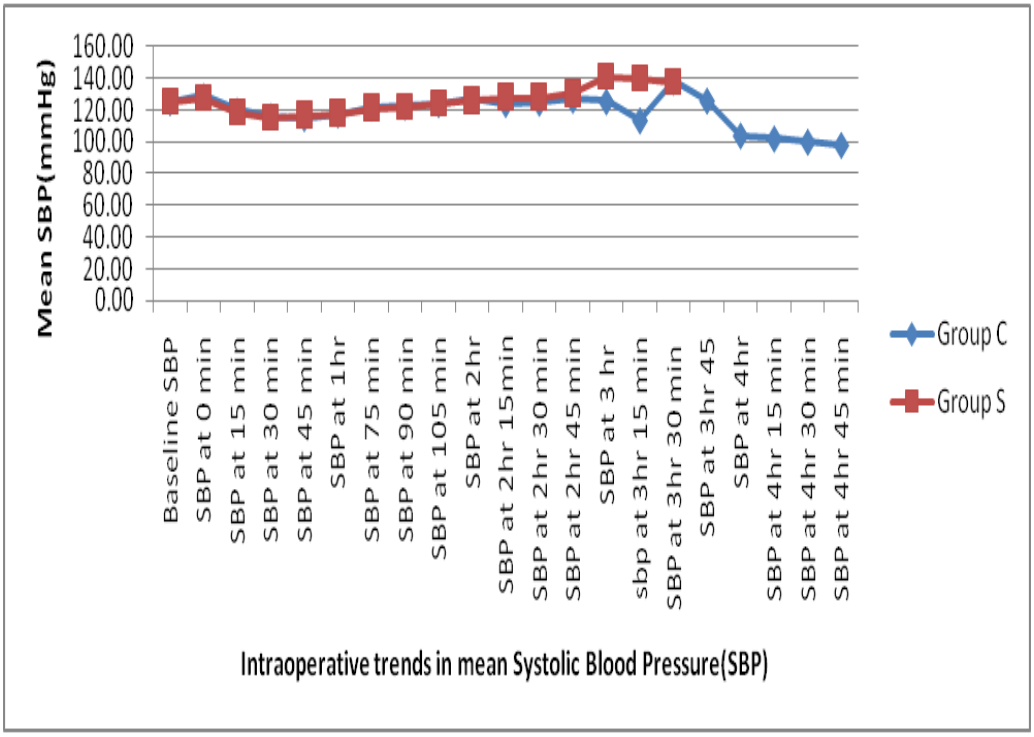


Figure 18: Trends in mean Systolic Blood Pressure (SBP)

Table 6d: Trends in Diastolic Blood Pressure (DBP):

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Baseline DBP	77.96	8.46	78.44	7.71	-0.531	0.596
DBP at 0 min	81.56	13.25	79.98	13.62	-0.141	0.888
DBP at 15 min	74.07	11.54	73.93	13.11	-0.057	0.955
DBP at 30 min	70.69	10.88	72.89	11.10	-0.833	0.405
DBP at 45 min	73.22	10.87	74.84	10.18	-0.730	0.467
DBP at 1hr	73.11	12.40	75.27	11.95	-0.954	0.340
DBP at 75 min	76.09	10.20	77.31	11.89	-0.615	0.539
DBP at 90 mIn	76.19	10.79	77.08	11.07	-0.434	0.664
DBP at 105 min	77.17	11.96	77.13	7.77	-0.156	0.876
DBP at 2hr	78.00	13.87	77.54	10.22	-0.651	0.515
DBP at 2hr 15min	75.00	9.01	80.27	7.14	-1.461	0.144
DBP at 2hr 30 min	71.57	11.75	78.86	11.82	-1.026	0.305
DBP at 2hr 45min	77.75	14.38	80.67	4.62	-1.070	0.285
DBP at 3 hr	74.25	18.41	91.50	3.54	-1.389	0.165
DBP at 3hr 15min	61.00	9.90	101.00	.	-1.225	0.221
DBP at 3hr 30 min	90.00	.	88.00	.	-1.000	0.317
DBP at 3hr 45	94.00	.	.	.		
DBP at 4hr	68.00	.	.	.		
DBP at 4hr 15 min	67.00	.	.	.		
DBP at 4hr 30 min	62.00	.	.	.		
DBP at 4hr 45 min	64.00	.	.	.		

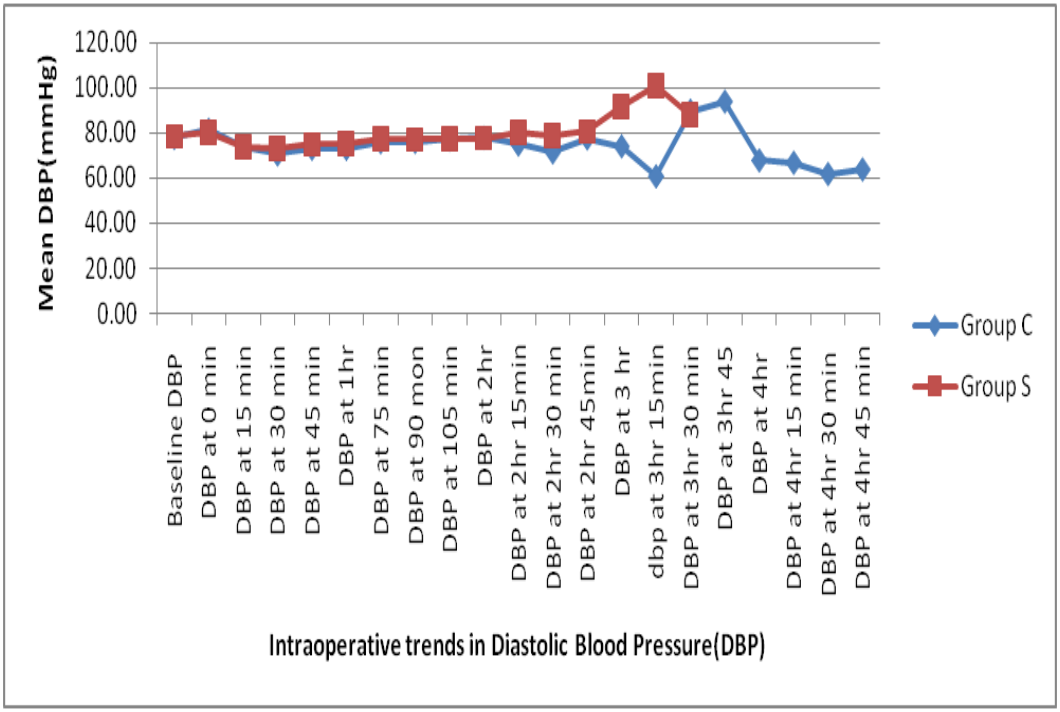


Figure 19: Trends in Diastolic Blood pressure (DBP)

Table 6e: Trends in $EtCO_2$

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
EtCO2 0 min	34.29	1.82	34.80	1.70	-1.473	0.141
EtCO2 at 15 min	34.04	1.51	34.53	1.55	-1.499	0.134
EtCO2 at 30 min	33.84	1.38	34.40	1.25	-1.826	0.068
EtCO2 at 45 min	33.64	1.25	34.07	1.34	-1.638	0.101
EtCO2 at 1hr	33.76	1.30	34.07	1.16	-1.345	0.178
EtCO2 at 75 min	34.02	1.33	34.22	1.15	-0.938	0.348
EtCO2 at 90 min	33.80	1.95	34.21	1.36	-0.453	0.650
EtCO2bat 105 min	34.17	1.26	34.07	1.07	-0.204	0.838
EtCO2 at 2 hr	34.65	1.34	34.46	1.35	-0.525	0.600
EtCO2 at 2hr 15min	34.33	1.41	34.60	1.45	-0.583	0.560
EtCO2 at 2hr 30min	33.86	1.46	34.29	1.25	-0.605	0.545
EtCO2 at 2hr 45min	34.25	1.50	34.33	1.15	0.000	1.000
EtCO2 at 3hr	34.25	1.71	34.67	1.53	-0.360	0.719
EtCO2 at 3hr 15min	34.67	2.31	34.00	.	-0.471	0.637
EtCO2 at 3hr 0min	35.00	.	33.00	.	-1.000	0.317
EtCO2 at 3hr45min	35.00	.	.	.		
EtCO2 at 4hr	35.00	.	.	.		
EtCO2 at 4hr 15min	34.00	.	.	.		
EtCO2at 4hr 30min	34.00	.	.	.		
EtCO2 at 4hr 45min	34.00	.	.	.		

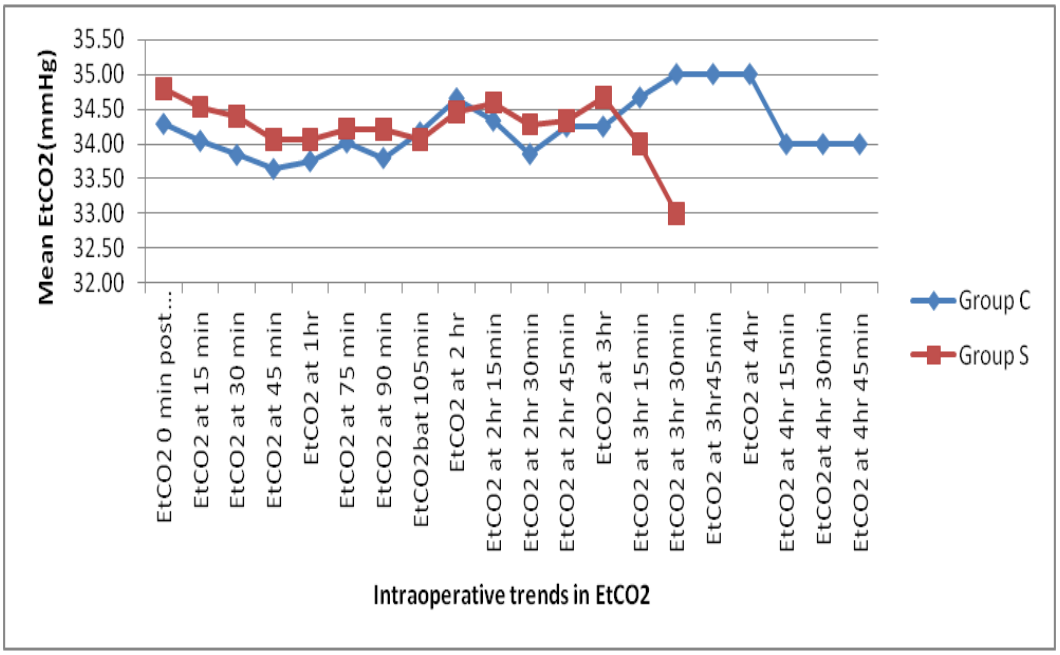


Figure 20: Trends in $EtCO_2$

7. Duration of Surgery

Duration of surgery was 116.00±30.39 minutes in group S and 114±39.82 minutes in group C.

There was no statistically significant difference between both the groups; p-value 0.508. (Table 7) (Figure 21)

Table 7: Duration of surgery in both groups

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Duration of Surgery (in minutes)	114.89	39.82	116.00	30.39	-0.662	0.508

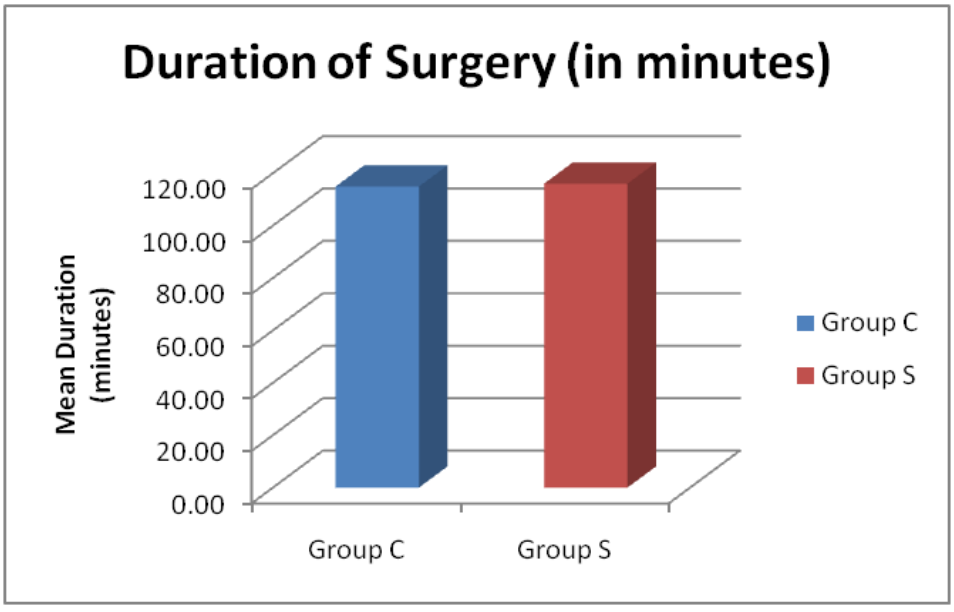


Figure 21: Duration of Surgery (in minutes)

8. Emergence Agitation

8 a) Incidence of EA: Incidence of emergence agitation was observed in all patients during and after extubation using the Richmond Agitation Sedation Scale (RASS). It was found that incidence of emergence agitation was higher i.e. 73.3% in Group C as compared to Group S i.e. 11.1%. The difference in both the groups was found to be statistically significant with a p-value of 0.001. (Table 8a) (Figure 22)

Table 8a: Comparison of incidence Emergence agitation:

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Emergence agitation	N	12	26.7%	40	88.9%	52	35.709	0.001
	Y	33	73.3%	5	11.1%	38		
Total		45	100.0%	45	100.0%	90		

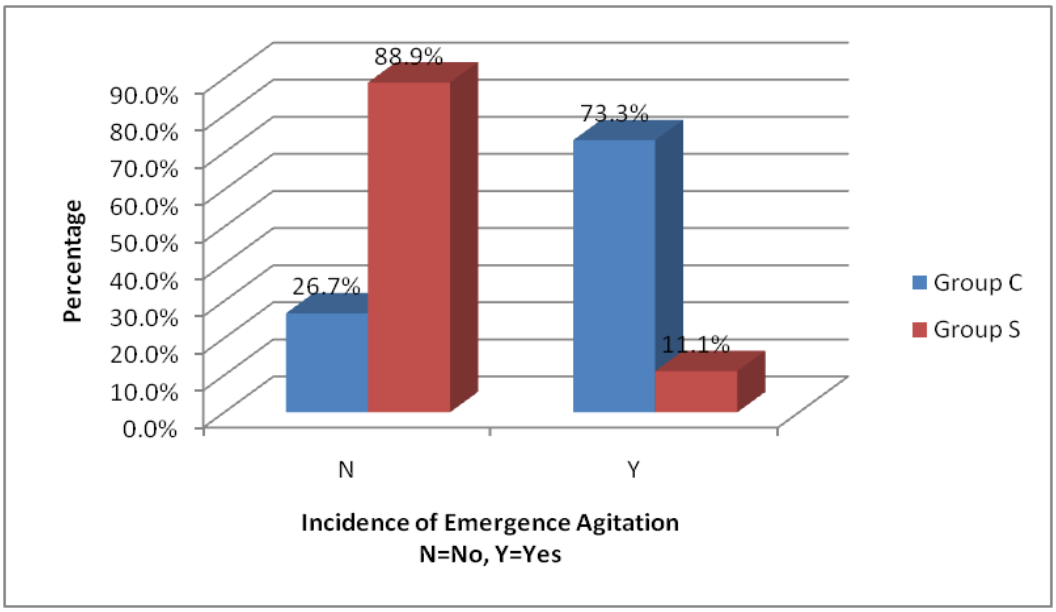


Figure 22: Incidence of Emergence agitation (N=No, Y=Yes)

8b) Severity of Emergence agitation: The severity of Emergence agitation was measured using the Richmond Agitation Sedation Scale (RASS). RASS score was measured immediately following extubation.

Immediately after extubation i.e. at 0 minutes and 5 minutes RASS score was found to be significantly lower in group S as compared to group C(p-value=0.001). There was no significant difference in RASS scores at 10, 15 or after 15 minutes of extubation.(Table 8b) The line graph displays the trend of severity of Emergence agitation over time(Figure 23a). Figure 23b displays a bar graph showing values of RASS scores at different time intervals.

Table 8b: RASS score after extubation at 0, 5, 10, 15 and after 15 minutes

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
RASS at 0 min	1.27	0.94	0.20	0.55	-5.660	0.001
RASS at 5 min	0.44	0.84	0.04	0.21	-2.781	0.005
RASS at 10 min	0.07	0.33	0.00	0.00	-1.422	0.155
RASS at 15 min	0.02	0.15	0.00	0.00	-1.000	0.317
RASS after 15 min	0.00	.000b	0.00	.000b	0.000	1.000

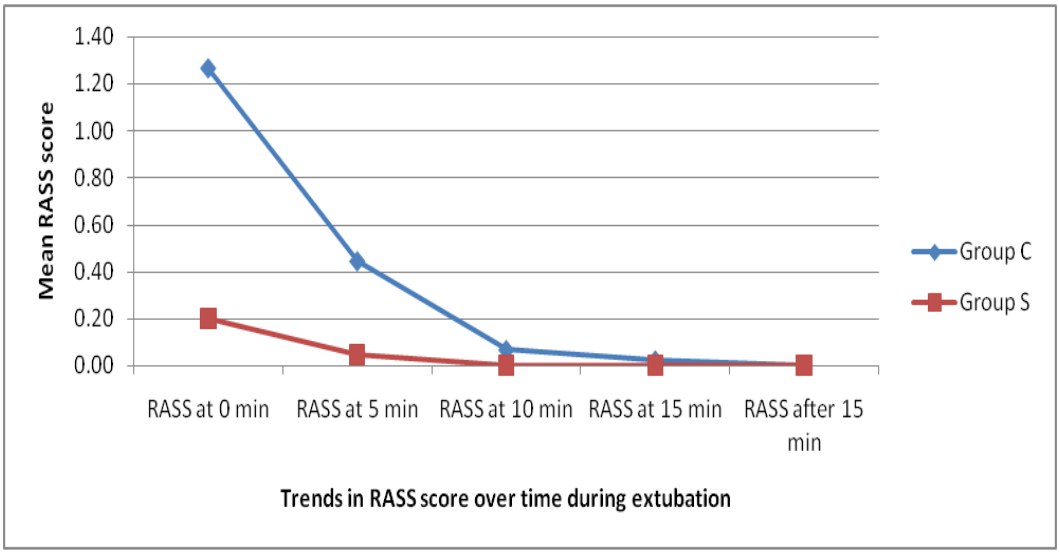


Figure 23a: Trends of RASS Scores over time

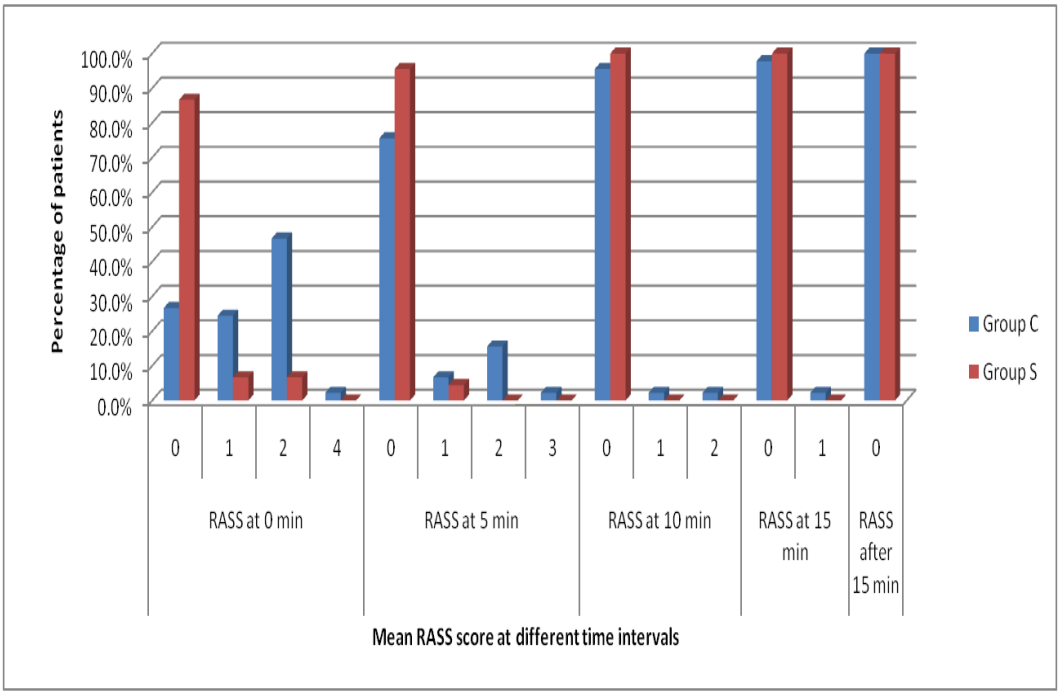


Figure 23b: Mean RASS Scores at different time intervals

8c) Emergence agitation and Age

To compare the incidence of emergence agitation with respect to age, patients were divided into 2 groups, those aged below 30 years and those aged 30 years or older. In the control group 22 patients i.e. 84.6% in the younger group had emergence agitation and 11 patients i.e. 57.8% in the older group had emergence agitation with a statistically significant p-value of 0.045. In the study group 2 patients in the younger group and 3 patients in the older group had emergence agitation with a non-significant p value. (Table 8c)

Table 8c: Incidence of emergence agitation with age:

GROUP			Age group		Total	Chi-square value	p-value
			< 30	> 30			
C	Emergence agitation	N	4	8	12	4.008	0.045
		Y	22	11	33		
	Total		26	19	45		
S	Emergence agitation	N	17	23	40	0.011	0.915
		Y	2	3	5		
	Total		19	26	45		

8d) Emergence agitation and type of surgery

The incidence of emergence agitation in different types of nasal surgeries was studied and it was comparable among all types of surgeries both in the control and study group i.e. p=0.463 and p=0.932 respectively. (Table 8d)

Table 8d: Incidence of Emergence agitation in different Nasal surgeries:

Group			Emergence agitation		Total	Chi-square value	p-value
			N	Y			
C	Type of Surgery	FESS	4	6	10	5.657	0.463
		FESS, Septoplasty	1	1	2		
		FESS, Septoturbinoplasty	2	7	9		
		Septoplasty	0	1	1		
		Septorhinoplasty	1	0	1		
		Septoturbinoplasty	4	17	21		
		Septoturbinoplasty+Adenoidectomy	0	1	1		
	Total		12	33	45		
S	Type of Surgery	FESS	16	2	18	0.844	0.932
		FESS, Septoplasty	4	0	4		
		FESS, Septoturbinoplasty	5	1	6		
		Septorhinoplasty	1	0	1		
		Septoturbinoplasty	14	2	16		
	Total		40	5	45		

8e) Emergence agitation and Type of nasal Blockade:

No significant difference was found among different types of nasal blockade (i.e. unilateral, bilateral, parietal, complete) and incidence of emergence agitation. (Table 8e)

Table 8e: Incidence of emergence agitation and type of nasal blockade:

		Emergence agitation		Total	Chi-square value	p-value
		N	Y			
Type of nasal blockade	Bilateral, Complete	2	3	5	3.723	0.59
	Bilateral, Partial	24	17	41		
	None	3	4	7		
	Unilateral, Complete	8	4	12		
	Unilateral, Partial	15	10	25		
Total		52	38	90		

8f) Duration of Emergence agitation: The mean duration of emergence agitation in minutes was 2.43±2.35 in group S and 2.74±3.42 in group C; the difference was statistically insignificant with p-value of 0.448.(Table 8f) (Figure 24)

Table 8f: Mean duration of Emergence agitation

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
Duration of Emergence Agitation (minutes)	2.74	3.42	2.43	2.35	-0.338	0.735

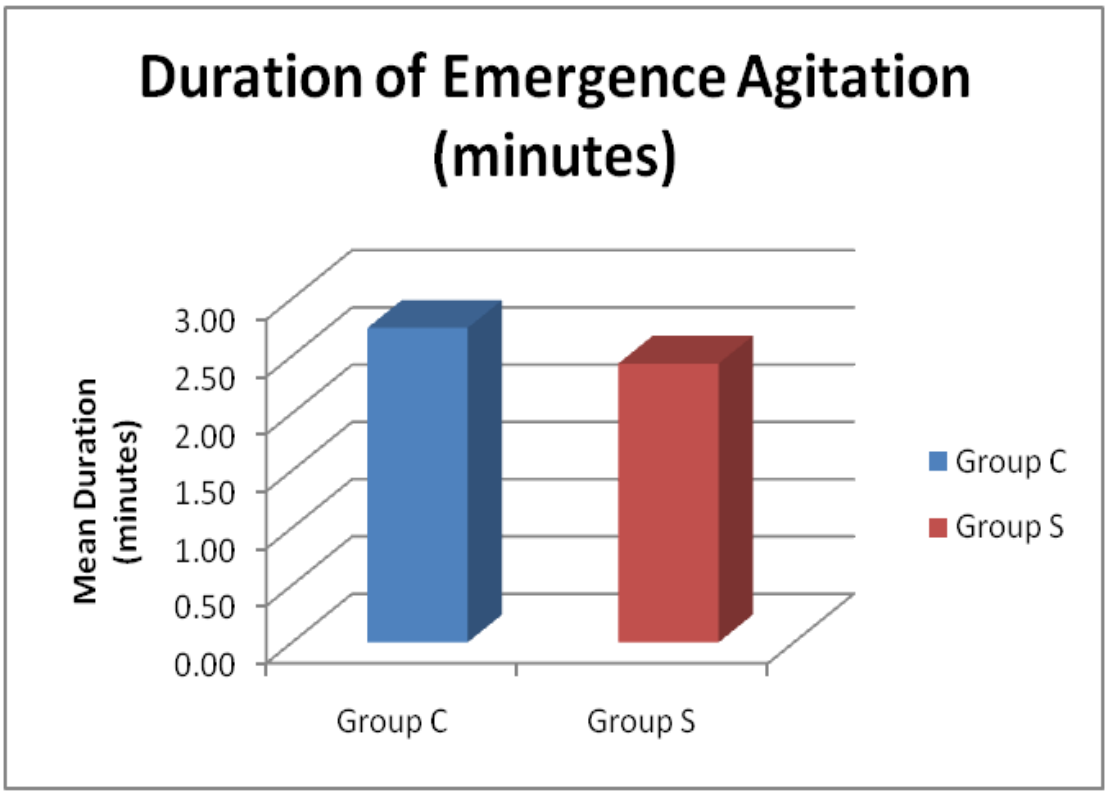


Figure 24: Mean duration of Emergence agitation (in minutes)

8g) Hemodynamic Parameters during Emergence:

Parameters including heart rate, Non-invasive blood pressure, SpO_2 and respiratory rate were studied during extubation. All the vital parameters were comparable between both groups.(Tables 8g.1-8g.5) (Figures 25-29)

8g.1) Trends in mean heart rate

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
HR 0 min After extubation	110.40	10.54	106.29	11.27	-1.500	0.134
HR 5 min after extubation	104.58	11.27	102.49	8.98	-0.894	0.371
HR at 10 min	98.29	9.56	96.84	10.11	-0.687	0.492
HR at 15 min	92.36	9.67	91.69	9.65	-0.170	0.865
HR after 15 min	85.44	8.63	87.13	9.91	-0.643	0.520

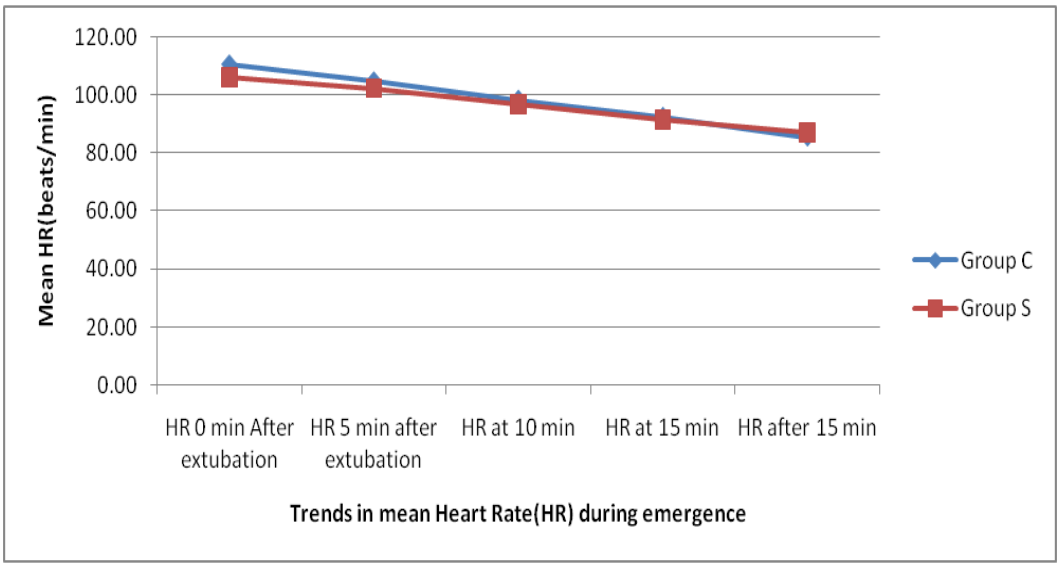


Figure 25: Trends in mean Heart Rate (HR) during emergence

8g.2) Trends in mean Systolic Blood pressure (SBP)

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
SBP 0 min after extubation	138.07	12.24	137.47	13.48	-0.170	0.865
SBP at 5 min	134.58	12.46	133.93	11.50	-0.142	0.887
SBP at 10 min	128.56	11.71	126.96	9.91	-0.206	0.836
SBP at 15 min	124.07	10.72	125.40	8.12	-1.218	0.223
SBP after 15 min	121.84	10.35	122.38	8.08	-0.629	0.530

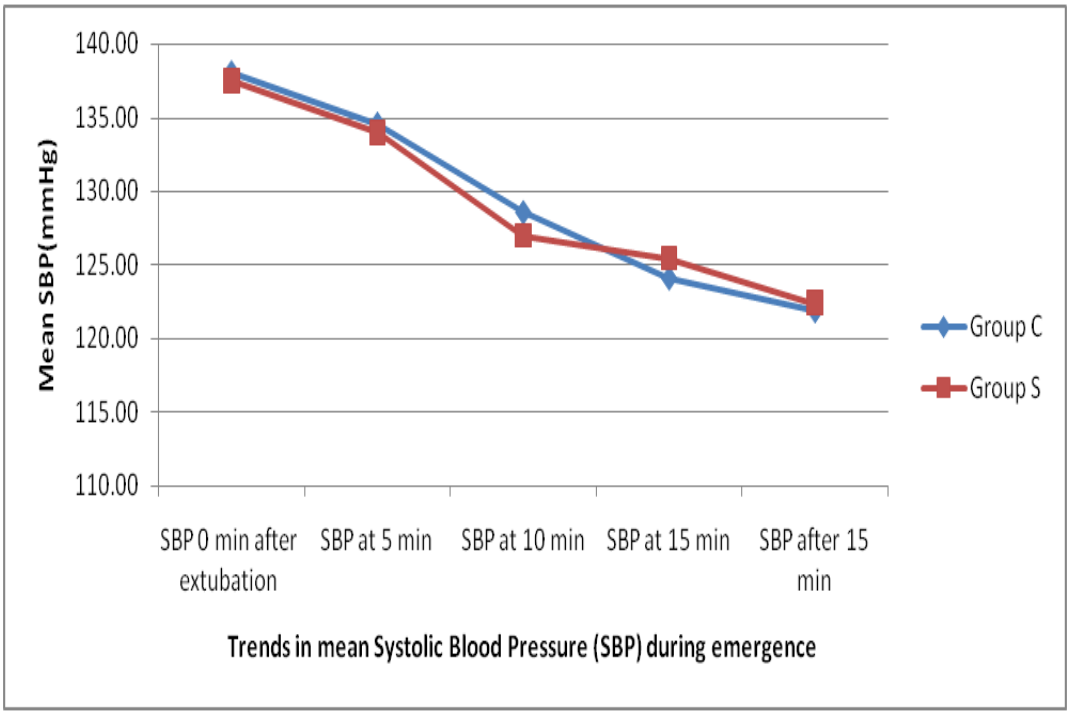


Figure 26: Trends in mean Systolic Blood Pressure (SBP) during emergence

8g.3) Trends in mean Diastolic Blood Pressure (DBP)

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
DBP 0 min after extubation	88.44	8.09	86.38	9.04	-0.976	0.329
DBP at 5 min	83.67	9.51	82.60	9.21	0.540	0.590
DBP at 10 min	79.47	9.38	77.20	7.82	-1.202	0.229
DBP at 15 min	74.84	7.21	74.71	7.21	-0.369	0.712
DBP after 15 min	74.09	7.32	74.89	7.01	-0.596	0.551

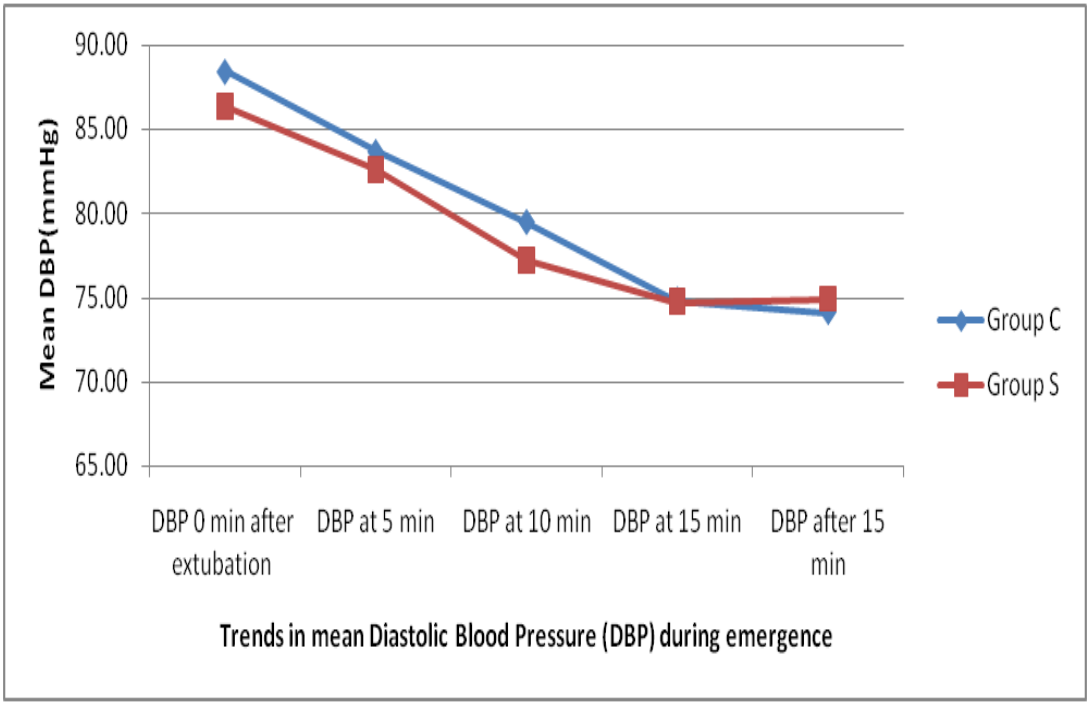


Figure 27: Trends in mean Diastolic Blood Pressure (DBP) during emergence

8g.4) Trends in mean SpO2:

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
SpO2 0 min after extubation SpO2 at 5 min	97.20	1.97	97.71	0.87	-1.073	0.283
SpO2 at 5 min	97.84	1.07	97.89	0.83	-0.625	0.532
SpO2 at 10 min	98.07	0.99	98.16	0.88	-0.410	0.682
SpO2 at 15 min	98.20	0.92	98.18	0.78	-0.265	0.791
SpO after 15 min	98.24	0.77	98.24	0.77	-0.184	0.854

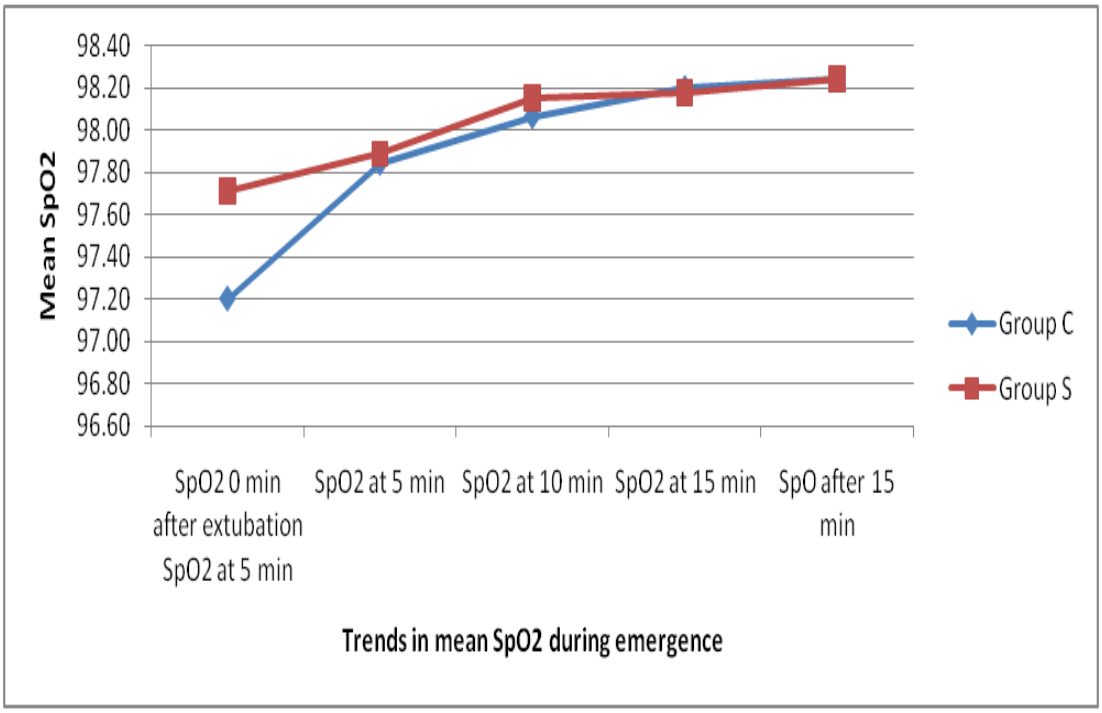


Figure 28: Trends in mean SpO2 during emergence

8g.5) Trends in mean Respiratory Rate (RR)

	Group C		Group S		Z	p-value
	Mean	SD	Mean	SD		
RR 0 min after extubation	11.09	0.90	11.42	1.18	-1.089	0.276
RR at 5 min	11.98	1.71	12.56	1.32	-0.907	0.364
RR at 10 min	13.31	1.08	13.89	1.42	-1.770	0.077
RR at 15 min	15.02	1.25	15.44	1.45	-1.259	0.208
RR after 15 min	17.58	1.22	17.82	1.09	-0.898	0.369

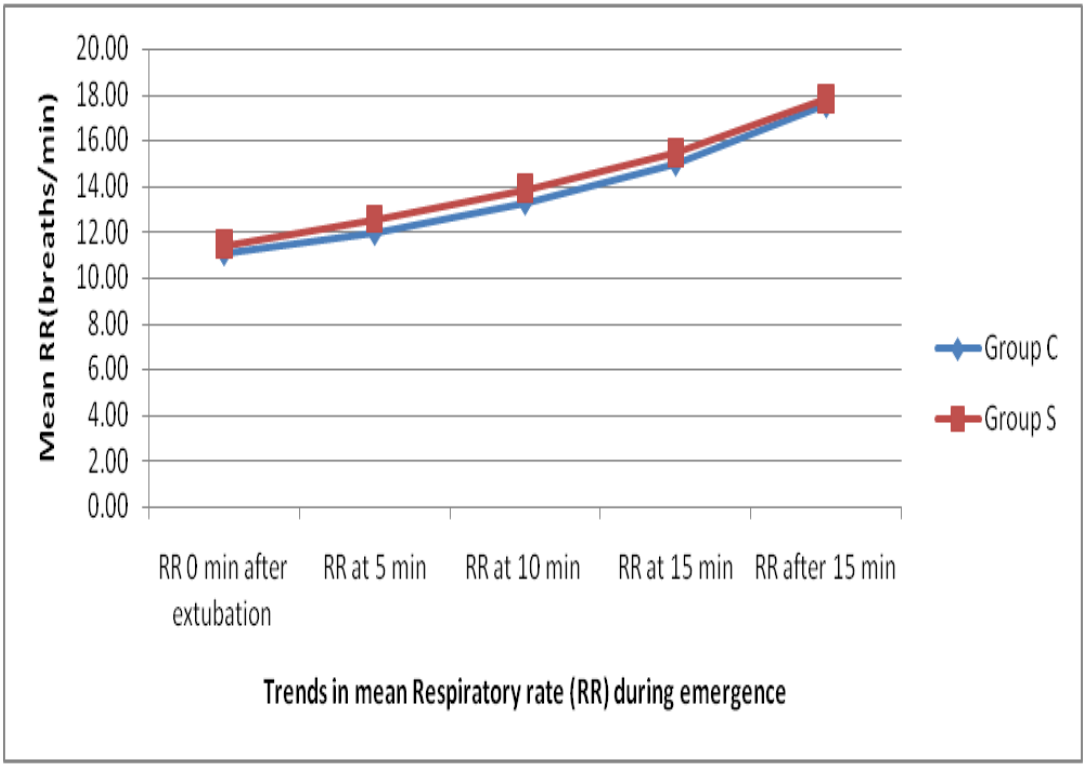


Figure 29: Trends in mean Respiratory rate (RR) during emergence

8h) Complications: Both groups were observed for any complications that occurred during extubation. Cough was present in 23(51.1%) patients in group C and 14(31.1%) patients in group S. In group C 2(4.4%) patients had a drop in oxygen saturation, 2(4.4%) removed nasal packing and 1(2.2%) patient had a breath holding spell. In group S 1(2.2%) patients had a breath holding spell. Although the number of patients with complications was more in group C as compared to group S the difference was not statistically significant.(Table 8h) (Figure 30).

Table 8h: Complications during emergence:

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Complications	Cough	23	51.1%	14	31.1%	37	3.717	0.054
	Breath holding spell	1	2.2%	1	2.2%	2	0.000	1.000
	Desaturation	2	4.4%	0	0.0%	2	2.045	0.153
	Removal of nasal packing	2	4.4%	0	0.0%	2	2.045	0.153

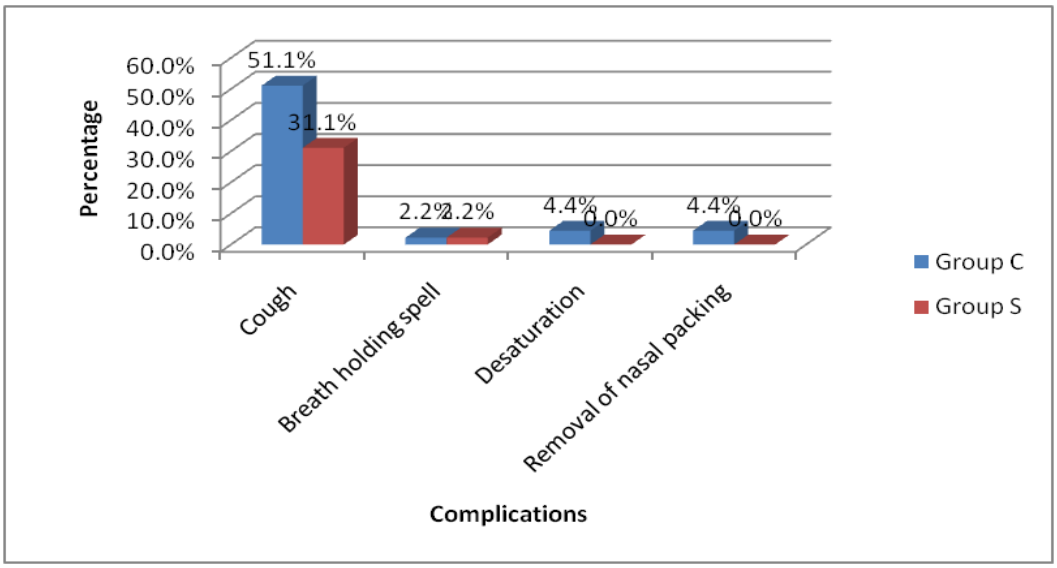


Figure 30: Complications during emergence

8i) Interventions done for complications: Interventions done for complications/agitation were also noted. Interventions included intravenous administration of injection midazolam, requirement of oral airway insertion or requirement of airway manoeuvres to prevent breath holding spell. In group C 1(2.2%) patient was given injection Midazolam 1 mg intravenously due to agitation, 1(2.2%) patient required Positive pressure ventilation and oral airway insertion due to drop in saturation, 1(2.2%) patient was given injection Midazolam 1 mg intravenously along with oral airway insertion, 1(2.2%) patient needed oral airway insertion along with jaw thrust. In group S 1(2.2%) patients needed oral airway and jaw thrust. (Table 8i) (Figure 31)

Table 8i: Interventions done for Complications/Agitation

		Group C		Group S		Total	Chi-square value	p-value
		No. of cases	%age	No. of cases	%age			
Intervention done		41	91.1%	44	97.8%	85		
	Inj. Midazolam 1mg	1	2.2%	0	0.0%	1		
	Oral airway insertion,PPV	1	2.2%	0	0.0%	1		
	Oral airway, Inj. Midazolam 1mg	1	2.2%	0	0.0%	1		
	Oral airway, jaw thrust	1	2.2%	1	2.2%	2		
Total		45	100.0%	45	100.0%	90		

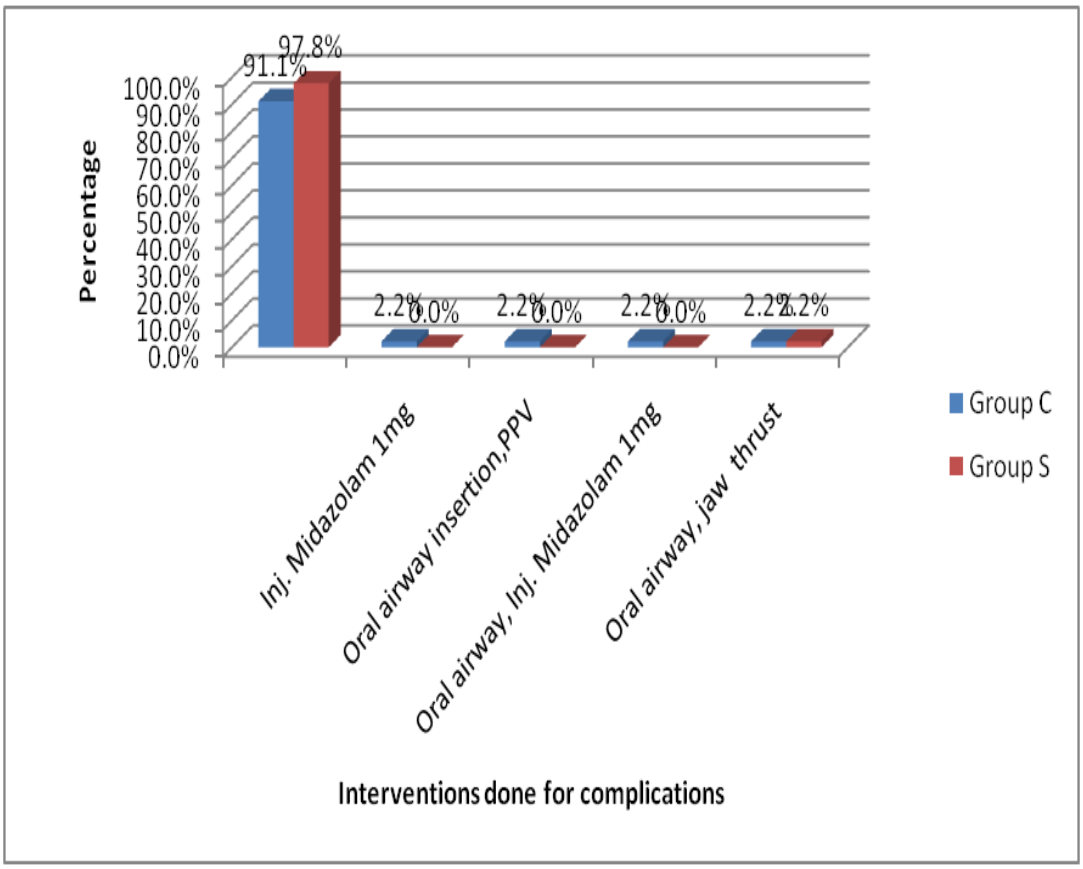


Figure 31: Interventions done for Complications/Agitation.

DISCUSSION

General anaesthesia is a state wherein a patient is administered medications for amnesia and analgesia with or without reversible muscle paralysis. It enables a patient to endure surgical procedures that would otherwise cause unbearable pain, heighten physiologic stress, and lead to unpleasant memories. Nevertheless, these advantages of general anaesthesia come with chances of inherent side effects. Side effects/complications occurring in the postoperative period can be broad and non-specific or specific to particular surgical procedures. [40] When complications related to anaesthesia are discussed, they are mostly centred around the airway, respiratory and circulatory systems with limited attention given to behavioural complications. However it is essential to recognise that general anaesthesia can lead to both short and long term behavioural issues. Immediate behavioural issues may manifest as emergence agitation or delirium, temper tantrums and hyperactivity. Long term behavioural complications might include nightmares, sleep disturbance, postoperative cognitive dysfunction and impaired emotional and cognitive development in children. [28,33,41]

Amongst all the behavioural complications, Emergence Agitation stands out as one of the most prevalent and concerning issues for an anaesthesiologist. It is defined as an “unpleasant state of extreme arousal” and is frequently observed in patients experiencing pain, fear, anxiety, and hypoxia. [4]

Emergence agitation poses risks to both patients and attending hospital staff. It contributes to the patient’s expenses, impacting their financial, physical and mental well-being. Patients who experience emergence agitation tend to have prolonged hospital stays, further increasing overall costs. Nasal surgeries are associated with a higher incidence of

emergence agitation as compared to other surgeries because sensory abnormality due to packed nasal cavities in the postoperative period causes a sense of suffocation and hence contributes to agitation. [13]

Several pharmacological and some non-pharmacological approaches in nasal surgeries have been researched to prevent agitation with varying degrees of success. In our study we used the non-pharmacological measure i.e. nasal packing to precondition the patients prior to surgery; we proposed that this preconditioning before the surgery might help in reducing incidence of emergence agitation. A total of 45 patients aged between 18 - 60 years scheduled for elective nasal surgery under general anaesthesia received preoperative nasal packing (Group S) while another 45 patients served as control (Group C).

In our study, incidence of emergence agitation in patients undergoing nasal surgeries came out to be 73.3% in the control group. Yu et al. [27] conducted a study in 2000 adults undergoing various types of surgeries under general anaesthesia to identify the risk factors of EA and found incidence of 60% and 55.4% in oral and ENT surgeries respectively. A higher incidence of EA in nasal surgeries in paediatric patients (61.4%) was also observed by Doerrfuss et al. [11], as compared to 34.3% in other surgeries. Hence, the results of these studies in terms of incidence, stand in good agreement with our study results.

In our research, the study group i.e. Group S patients were preconditioned with nasal packing 12 hours prior to surgery and were trained to breathe through the mouth overnight. It was found that incidence of agitation was significantly less in the study group (i.e. 11.1%) as compared to the control group (i.e. 73.3%). This nasal packing served as an important non-pharmacological measure to reduce the incidence of agitation in patients who have their nasal cavities packed in the postoperative period. Xu et al.

[13] in 2023 in their study on 200 patients aged 18 to 82 years undergoing FESS used nasal splinting and gave mouth breathing training in the Preconditioning(P) group one hour before surgery in a pre-anaesthesia room. The incidence of EA in the preconditioning group stood at 16.30%, which was significantly lower than that of the control group (35.56%, P=0.004). Our methodology closely mirrored that of this study except that preconditioning in the study group was done using a nasal pack that was placed 12 hours prior to the surgery. The extent of reduction of EA was also more in our study indicating that the longer duration of simulation or preconditioning yields better results. This is also supported by the study done by Kasem and Abdelkar [32] in 2016 in which the effect of different durations of preoperative external nasal compression on EA in patients undergoing nasal surgery was compared. External nasal compression was done for 30 minutes in the study group and for 10 minutes in the control group. They concluded that, increase in the duration of preoperative nasal compression leads to a decrease in the incidence of EA. In a study performed by Bang et al. [44], patients in the study group were trained to breathe through their mouth using a nasal clip at least 3 times a day ,one day prior to surgery along with a 30 minute session of informative explanations about the nasal discomfort and obstruction following surgery. No statistically significant difference in the incidence of emergence agitation and other outcomes including opioid requirement, pain scores or quality of recovery was recorded in their study. This might be due to the shorter and intermittent duration of nasal compression in their study as compared to the continuous 12 hour simulation performed in our study.

To study the incidence of EA with respect to age, patients in both groups were sub categorised into two groups: 18-30 years and 31-60 years. In group C, EA was more prevalent in the younger age group (n=24) compared to the older age group (n=14), with a statistically significant p-value of 0.034. Similarly, Elsersy et al. [12] in their study on patients

undergoing Functional Endoscopic Sinus Surgery (FESS) also observed higher incidence of agitation (85%), among younger patients (18 to 30) as compared to (35%) amongst their older counterparts (31 or above). In group S, a significant decrease in incidence of EA was observed in both younger and elder groups as compared to Group C. But when we compared these subs groups with each other, both showed a similar decrease in incidence of EA and no significant difference was observed. Thus, it can be inferred that preconditioning with nasal packing was equally effective in decreasing EA in all patients irrespective of their age.

Various research trials have shown the reduction in incidence of emergence agitation using pharmacological measures. For example, Kim et al. [29] found that intraoperative dexmedetomidine infusion in nasal surgery patients significantly reduces the incidence of agitation by 24%. Almajali et al. [43] concluded that use of intramuscular ketamine towards the end of nasal surgery also reduces incidence of agitation by 51.3%. We achieved a significant reduction of 62.2% in emergence agitation in our study (11.1% v/s 73.3%) without the use of any pharmacological measure. Previous studies have shown that pharmacological approaches such as opioids and propofol, used to decrease the incidence of emergence agitation, are linked to respiratory depression. In a research done by Garg et al. [35], on EA in patients undergoing nasal surgery, use of dexmedetomidine was associated with significant residual sedation and extended stay in the PACU. Our study revealed no adverse effects associated with the intervention, thereby minimising both potential side effects and associated costs.

The induction of general anaesthesia in our study was done using iv induction agent propofol and maintenance of anaesthesia was done using inhalational agent Sevoflurane 2% in 50% oxygen and nitrous oxide. Jo et al. [38] in a randomised controlled trial compared two anaesthetic techniques in nasal surgeries i.e. maintenance with total intravenous

anaesthesia (TIVA) v/s volatile induction and maintenance (VIMA). It was found that incidence of EA was significantly lower in the TIVA group (2.5%) as compared to VIMA group (i.e.20.0%). Elsersy et al. [12] in 2017 conducted a study in 140 patients of ASA grade I and II undergoing Functional endoscopic Sinus Surgery (FESS) to identify the risk factors of EA. Anaesthesia was maintained with inhalational agent sevoflurane 2% in 50% oxygen and air. The prevalance of EA was as high as 85%. A higher incidence of emergence agitation with sevoflurane as compared to other inhalational agents has also been reported in various previous studies.[6,14,22,25,30,37,45] This is in concordance with our study in which sevoflurane was used and the incidence of EA in the control group came out to be 73.3%.

The intensity of EA can be observed and measured using a variety of scales such as WATCHA, DOS, CRAVERO, RASS, RSAS, PAED (for paediatric patients), etc. [4,23] In our study we employed Richmond Agitation Sedation Scale (RASS) to assess and grade the severity of agitation. Patients having RASS of ≥+1 during emergence from anaesthesia were considered positive for EA. It was observed that 46.4% patients in group C had a RASS of +2 at 0 minutes as compared to 6.7% in group S. One patient (2.2%) in group C had a RASS score of +4 at 0 minutes while no patient in group S had a RASS score more than +2. At 5 minutes, 15.6% of patients in group C had a RASS score of +2 while no patient in group S had a RASS score of more than +1. Mean RASS scores were significantly higher in the control group as compared to the study group at 0 minutes and 5 minutes ($p=0.001$ & $p=0.005$ respectively). At 10 minutes mean RASS scores were comparable in both groups. Thus, our study results show that the preconditioning with nasal packing not only decreases the incidence of EA but also reduces the severity of agitation. In a similar study performed by Xu et al. [13] to see the effect of preoperative nasal splinting and mouth breathing training on emergence

agitation, RSAS scale was used to evaluate EA. The severity of agitation came out to be similar in both the groups. This difference of results might be because they used a different scale for grading the severity of agitation and they did not define specific time intervals during emergence. No other trial has studied the effect of preconditioning/nasal packing on the severity of agitation.

We enrolled patients undergoing various types of nasal surgeries including FESS, septoturbinoplasty, septorhinoplasty or septoplasty etc. in our study. We recorded the specific type of nasal surgery that was scheduled for each patient. FESS with or without septo/septoturbinoplasty was the most common surgery done in our study followed by Septoturbinplasty alone. We then examined whether any particular surgery independently correlated with a higher incidence of emergence agitation. It was found that the difference of incidence of EA was not statistically significant among different types of nasal surgeries. Bhiwal et al. [42] also studied incidence of agitation in relation to particular nasal surgery and concluded that incidence of agitation was statistically non-significant among septoplasty, FESS with turbinoplasty, fracture reduction and other nasal surgeries. Their results are consistent with our study.

Emergence agitation is a phenomenon that is mainly limited to the immediate postoperative/post-anaesthetic period. The mean duration of EA in our study in group C was 2.74±3.42 and in group S was 2.43±2.35 minutes. This is in concordance with a previous randomised controlled trial done by Jo et al. [38] in 2016, wherein EA subsided within 5 minutes after extubation in patients undergoing nasal surgery. Kim et al. [21] also studied EA in 100 adult patients aged 20-58 years undergoing nasal surgery. The period of emergence agitation in their study was limited to <5 minutes in all patients.

Additionally, we assessed patients for their tolerance to nasal packing. In the study group, where nasal cavities were packed before surgery, tolerance was evaluated both pre-procedure and post-procedure. Postoperative tolerance was compared between the two groups. To study the tolerance we used a survey consisting of various parameters including headache, nose ache, earache, sneezing and difficulty sleeping. Postoperative incidence of headache, nose ache and difficulty sleeping in our study was significantly lower in the study group as compared to the control group. DİKİCİ et al. [15] used a similar scale to study the effects of silicone nasal splints v/s polyvinyl acetate on patient comfort. In their study the effects were studied after the packing was removed in the postoperative period, whereas we studied the tolerance while the packing was in situ. The literature on the tolerance for nasal packing which is done in almost all nasal surgeries is limited, despite its recognised association with EA. Ours is the only study in which a nasal packing survey for tolerance has been explored.

Patients in our study were observed for any complications at the time of extubation/emergence. In the control group 2(4.4%) patients removed the nasal packing post operatively and 2(4.4%) patients had episodes of desaturation while there was no such episode in the study group. Difference between both groups was not significant. Inj. Midazolam 1 mg was given to 2 patients who developed severe EA, and 2 patients needed positive pressure ventilation with oral airway insertion. Other complications that were noted included cough and breath-holding spells that came out to be comparable in both the groups. Elsersy et al. [12] observed complications like removal of venous cannulas and oxygen masks resulting in bleeding and hypoxia among agitated patients who underwent nasal surgeries. No such episode was observed in our study.

Demographic data including age, gender, ASA grade, comorbidities and BMI was comparable in both the groups. Mean duration of surgery was 114.89±39.82 minutes in group C and 116.0±30.39 minutes in group S which was statistically non-significant. There was no significant difference in hemodynamic parameters in both the groups both intraoperatively and postoperatively. Each patient's preoperative nasal blockade type was recorded, however no correlation was discerned between the type of nasal blockade and EA.

There are few limitations of our study, firstly, surgeries were performed by different surgeons, hence the technique of the surgeries and technique of nasal packing were different which could have resulted in variable degree of pain and discomfort in the immediate postoperative period. Secondly, post operative pain scores and requirement of analgesics were not noted in our study during emergence which might have affected the results, with pain being a known contributor of EA. Also, level of preoperative apprehension or anxiety was not noted in either of the groups. Lastly, it was a single centre study and included only the Indian population belonging to a specific geographic area.

In conclusion, preconditioning with nasal packing in patients undergoing nasal surgery is an effective non-pharmacological measure to reduce incidence as well as severity of emergence agitation thus eliminating the added costs of pharmacological measures and prolonged hospital stay. It also helps in improving the patient's tolerance for postoperative nasal packing thereby increasing the overall comfort.

SUMMARY AND CONCLUSION

The present study entitled “Effect of preconditioning with nasal packing on Emergence Agitation in patients undergoing nasal surgery” was conducted in the Department of Anaesthesiology, Dayanand Medical College & Hospital, Ludhiana.

A total of 90 patients undergoing elective nasal surgery under general anaesthesia were included in this randomised controlled trial. Patients were divided into 2 groups of 45 each i.e. the study(S) and the control(C) group. Patients in group S received nasal packing with merocel 12 hours prior to surgery while no intervention was done in group C. Patients in both the groups were counselled about the nasal packing that would be in-situ postoperatively, during the pre-anaesthetic checkup. All the patients received general anaesthesia with the same technique. During emergence all patients were observed for incidence as well as severity of emergence agitation using the RASS scale. During the postoperative period, tolerance for the nasal packing was observed using the Tolerance Score.

Following observations were elucidated from the study:

1. The incidence of emergence agitation was 11.1% in group S and 73.3% in group C. This difference was statistically significant with a p-value of 0.001.
2. The severity of emergence agitation was more i.e. RASS scores were higher in group C as compared to group S at 0 and 5 minutes after extubation; p-values=0.001 and 0.005 respectively.
3. The duration of emergence agitation was 2.43±2.35 minutes in group S and 2.74±3.42 minutes in group C with p-value=0.735.
4. The incidence of postoperative headache, nose ache and difficulty sleeping was significantly less in group S as compared to group C

with p-values 0.046, 0.004 and 0.002 respectively, suggesting better tolerance in the study group.

5. Although the complications including cough, breath-holding spell, hypoxia and removal of packing were more frequently observed in group C, the difference was statistically non-significant.
6. The demographic parameters including the age, sex, BMI, Comorbidities and ASA grade were comparable in both the groups and there was no significant difference in the type of nasal blockade and the type of nasal surgery performed in both the groups.
7. The duration of surgery and intraoperative hemodynamic parameters were similar in both the groups with no statistically significant difference.

We conclude that preoperative nasal packing in nasal surgery patients reduces the incidence as well as severity of emergence agitation. It also improves the overall tolerance and comfort of the patients for the postoperative nasal packing.

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KEY TO MASTER CHART

Category	Code	Inference
Sex	M	Male
	F	Female
Group	C	Control
	S	Study
American Society of Anaesthesiologists	ASA I II	Grade I II
Nasal Blockade	Y	Yes
	N	No
Type of Nasal Blockade	B	Bilateral
	U	Unilateral
	P	Partial
	C	Complete
Alcohol Use	Y	Yes
	N	No
Comorbidities	T2DM	Type 2 Diabetes Mellitus
	HCV positive	Hepatitis C Virus positive
Vitals	HR	Heart Rate
	SBP	Systolic Blood pressure

	DBP	Diastolic Blood Pressure
	RR	Respiratory Rate
	$EtCO_2$	End Tidal Carbon Dioxide
	SpO_2	Oxygen saturation
Emergence Agitation	Y	Yes
	N	No
Tolerance for Nasal packing	0-4	Rated according to the Nasal packing Tolerance Score
Richmond Agitation Sedation Scale	RASS 0 to +4	According to the RASS scale

S. no.	MRD No.	Age (in years)	Sex (F=female M=male)	Group	ASA	BMI	Chief complaint	Nasal Blockade	Type of nasal obstruction	Bilateral/ Unilateral	Partial/ Complete	Duration (in months)	Type of Surgery	H/o OSA	Comorbidities if any	Alcohol use	Post-op Headache	Pre-op Nose ache (2hr after packing)	Pre-op Nose ache before shifting to OR	Post-op Nose ache	Pre-op Ear ache 2 hr after packing
1	1419648	29	F	C	I	22.7	Nasal pain	N	None	None	None	0	Septoplasty	No	None	N	0			2	
2	1423674	34	M	C	II	30.3	Nasal blockade	Y	Bilateral, Partial	B	P	12	Septoturbinoplasty	Yes	Obese I	N	0			2	
3	1429840	26	M	C	I	22	Nasal blockade	Y	Unilateral, Partial	U	P	18	FESS	No	None	N	1			3	
4	1427529	21	M	C	I	23	Nasal blockade, Post nasal discharge	Y	Unilateral, Partial	U	P	60	Septoturbinoplasty	No	None	N	0			2	
5	1399457	23	M	C	I	24	Nasal blockade	Y	Unilateral, Partial	U	P	6	Septoturbinoplasty	No	None	N	0			1	
6	1208082	34	M	C	I	23.2	Nasal blockade	Y	Bilateral, Partial	B	P	12	Septoturbinoplasty	No	None	N	0			1	
7	1421690	19	M	C	II	32.6	Nasal blockade	Y	Unilateral, Partial	U	P	5	FESS	No	Obese I	N	0			2	
8	1425653	20	M	C	I	25.2	Posterior Nasal Discharge, Nasal blockade	N	Unilateral, Partial	U	P	36	Septoturbinoplasty	No	None	N	0			1	
9	1458016	57	M	C	II	27.2	Sinusitis, Headache	N	None	None	None	1	FESS	No	Hypertension	N	1			2	
10	1462228	42	M	C	II	25.8	Nasal blockade, Headache	Y	Bilateral, Partial	B	P	12	Septoturbinoplasty	No	Hypertension	N	0			2	
11	1463696	32	M	C	I	27.6	Difficulty breathing, Nasal blockade	Y	Unilateral, Partial	U	P	12	Septoturbinoplasty	No	None	N	0			1	
12	1463429	19	F	C	I	20.5	Nasal blockade, Visible external deformity	Y	Unilateral, Partial	U	P	1	Septorhinoplasty	No	None	N	0			2	
13	1449066	32	M	C	I	23.2	Nasal blockade	Y	Unilateral, Partial	U	P	1	Septoturbinoplasty	No	None	N	0			3	
14	1145875	18	M	C	I	28.4	Nasal blockade, nasal discharge	Y	Unilateral, Partial	U	P	3	Septoturbinoplasty	No	None	N	0			1	
15	1478826	21	F	C	I	24.1	Nasal Blockade	Y	Bilateral, Partial	B	P	1	FESS	No	None	N	0			1	
16	1452601	53	M	C	II	28.7	Nasal Blockade	Y	Unilateral, Partial	U	P	3	FESS	No	Hypertension	Y	1			1	
17	1476953	30	M	C	I	26	Nasal Blockade	Y	Bilateral, Partial	B	P	6	FESS, Septoturbinoplasty	No	None	Y	1			0	
18	1475907	28	M	C	I	22.4	Nasal blockade	Y	Bilateral, Partial	B	P	4	FESS	No	None	N	0			1	
19	1488866	34	M	C	I	22.1	Nasal blockade	Y	Bilateral, Complete	B	C	24	FESS	No	None	N	1			0	
20	1500672	18	M	C	I	21.2	Nasal blockade	Y	Bilateral, Partial	B	P	6	Septoturbinoplasty	No	None	N	0			2	
21	751024	44	M	C	II	34.1	Nasal Blockade	Y	Unilateral, Partial	U	P	2	FESS, Septoturbinoplasty	No	Hypertension	N	1			1	
22	1468581	28	M	C	I	22	Nasal Blockade	Y	Unilateral, Partial	U	P	3	FESS, Septoturbinoplasty	No	None	N	0			3	
23	1386744	28	M	C	I	14.7	Excessive Sneezing, Nasal Bkockade	Y	None	None	None	24	FESS, Septoturbinoplasty	No	None	N	0			2	
24	1503713	32	F	C	I	22	Facial pain, Headache, Nasal Blockade	Y	Bilateral, Partial	B	P	0.26666667	FESS, Septoturbinoplasty	No	None	N	0			1	
25	234760	34	M	C	I	25	Nasal blockade, Post nasal discharge	Y	Bilateral, Partial	B	P	4	Septoturbinoplasty	Yes	None	N	0			1	
26	1508718	23	F	C	I	23	Nasal blockade, Post nasal discharge	Y	Bilateral, Partial	B	P	36	Septoturbinoplasty	No	None	N	0			1	
27	1517677	18	M	C	I	19.2	Nasal blockade, Recurrent Sore throat	Y	Unilateral, Partial	U	P	12	Septoturbinoplasty	No	None	N	0			1	
28	1521252	31	M	C	II	26	Nasal blockade	Y	Bilateral, Partial	B	P	24	FESS	No	Hypertension	N	0			0	
29	1523639	28	M	C	I	18.1	Nasal Blockade	Y	Bilateral, Complete	B	C	6	Septoturbinoplasty	No	None	N	0			0	
30	1471673	19	M	C	I	20	Nasal blockade, Excessive sneezing	Y	Bilateral, Partial	B	P	3	Septoturbinoplasty+Adenoidectomy	No	None	N	0			1	

S. no.	Pre-op ear ache before shifting to OR	Post-op ear ache	Pre-op Sneezing 2 hr after packing	Pre-op Sneezing before shifting to OR	Post-op Sneezing	Pre-op Difficulty sleeping 2 hr after packing	Pre-op difficulty sleeping before shifting to Or	Post-op Difficulty sleeping	Duration of Surgery (in minutes)	Volume of fluids transfused (in ml)	Estimated blood loss(ml)	Episode of Hypertension	Inj Esmolol given; Total dose	Hypotension	Inj. Ephedrine dose(mg) if given
1		0			0			1	125	1100	70	N		Y	3
2		0			0			0	120	700	50	N		N	
3		0			0			0	130	1000	100	Y	60	N	
4		0			0			0	135	1100	75	Y	10	N	
5		0			0			1	150	1800	150	Y	20	N	
6		0			0			0	60	600	30	N		Y	3
7		0			0			1	180	2000	200	Y	50	N	
8		0			0			0	120	1000	100	Y	20	N	
9		0			0			0	80	800	50	Y	10	N	
10		0			0			0	130	900	100	Y	30	N	
11		0			0			0	110	1000	75	Y	10	N	
12		0			1			0	195	1400	200	Y	20	N	
13		0			0			1	75	600	75	N		N	
14		0			0			0	285	2500	300	Y	40	N	
15		0			0			0	90	1100	75	Y	30	N	
16		0			0			0	80	800	70	Y	30	N	
17		0			0			0	60	600	70	Y	10	N	
18		0			0			0	120	1000	100	Y	30	N	
19		0			0			0	110	1200	100	Y	10	N	
20		0			0			1	90	600	70	Y	10	N	
21		0			0			0	110	1000	100	Y	10	N	
22		0			0			1	150	1000	100	Y	20	N	
23		0			1			1	110	800	75	Y	20	N	
24		0			0			0	150	1400	150	N		N	
25		0			0			0	95	1000	100	N		N	
26		0			0			0	80	1000	70	N		N	
27		0			0			0	120	1100	100	N		N	
28		0			0			0	90	800	50	N		N	
29		0			0			0	120	1000	80	N		N	
30		0			0			1	105	1000	100	Y	10	N	

S. no.	Post operative packing	Baseline HR	HR at 0 min	HR at 15 min	HR at 30 min	HR at 45 min	HR at 1 hr	HR at 75 min	HR at 90 min	HR at 105 min	HR at 2 hr	HR at 2hr 15 min	HR at 2hr 30min	HR at 2hr 45min	HR at 3hr	HR at 3hr 15min	HR at 3hr 30min	HR at 3hr 45min	HR at 4hr	HR at 4hr 15min	HR at 4hr 30min	HR at 4hr 45min	Baseline SpO2	SpO2 at 0 min	SpO2 at 15 min	SpO2 at 30 min	SpO2 at 45 min	SpO2 at 1hr	SpO2 at 75 min	SpO2 at 90 min
1	Bilateral	82	86	76	82	84	80	65	79	76	80												99	100	100	99	100	99	99	100
2	Bilateral	96	94	103	102	91	90	93	88	90	89												96	99	98	97	96	95	95	96
3	Bilateral	102	110	114	106	94	93	111	109	106	114												99	100	99	98	99	100	99	99
4	Bilateral	77	98	108	86	108	86	108	103	95	94	110											100	100	100	100	100	100	99	100
5	Bilateral	76	89	80	76	79	101	90	89	82	106	104	114										100	100	100	100	100	100	100	100
6	Bilateral	92	99	120	101	92	90																99	100	100	99	99	99		
7	Bilateral	84	95	88	96	84	82	99	90	86	88	102	85	100	90								99	100	100	100	100	100	100	100
8	Bilateral	101	112	122	109	103	103	101	95	97	105												98	100	99	99	98	97	98	97
9	Bilateral	84	109	91	90	90	95	92	96														98	100	99	99	98	98	98	98
10	Bilateral	84	88	84	90	89	96	97	92	89	94												98	100	98	98	97	97	98	98
11	Bilateral	74	92	100	89	85	82	81	83	92													99	99	99	99	99	99	99	99
12	Bilateral	95	124	109	105	106	104	110	111	120	108	107	108	109	105	108							99	100	99	99	99	99	99	99
13	Bilateral	89	94	88	86	89	85	90															98	99	99	99	99	99	99	
14	Bilateral	90	101	96	94	95	92	108	96	95	92	90	92	96	94	96	101	98	94	92	94	92	98	99	99	99	99	99	99	98
15	Bilateral	100	116	124	115	131	113	120	109														99	99	99	99	99	99	99	98
16	Bilateral	101	114	98	82	92	76	89															98	100	100	99	99	99	99	
17	Bilateral	77	78	110	104	89	86																99	100	99	99	99	100		
18	Bilateral	90	101	100	112	93	98	89	92	100	98												98	100	99	99	99	98	98	98
19	Bilateral	78	90	85	83	87	102	89	87	88													99	100	100	100	100	99	99	100
20	Bilateral	98	120	115	120	100	102	105	104														99	99	98	99	98	98	98	98
21	Bilateral	68	99	84	74	78	89	101	92	88													97	99	97	96	97	98	97	98
22	Bilateral	92	130	110	101	94	88	94	92	88	89	86	92										99	100	99	99	99	99	100	99
23	Bilateral	76	108	110	102	101	102	101	110	103													98	100	100	100	100	100	100	100
24	Bilateral	96	110	112	109	112	111	110	115	109	110	112	111										98	100	99	99	99	99	99	99
25	Bilateral	78	100	92	86	82	90	82	94														99	100	99	100	99	98	98	98
26	Bilateral	96	110	98	94	92	90	98															98	100	99	99	98	98	98	
27	Bilateral	79	100	90	100	78	78	79	76	75	77	84											98	100	98	99	99	98	98	98
28	Bilateral	90	110	90	87	86	85	89	92														98	99	99	99	99	98	98	99
29	Bilateral	70	92	88	82	90	82	86	83	84	94												100	100	100	100	99	100	99	100
30	Bilateral	70	94	102	98	88	76	74	80	82													100	100	100	100	99	100	100	100

S. no.	SpO2 at 105 min	SpO2 at 2hr	SpO2 at 2hr 15min	SpO2 at 2hr 30min	SpO2 at 2hr 45min	SpO2 at 3hr	SpO2 at 3hr 15min	SpO2 at 3hr 30min	SpO2 at 3hr 45min	SpO2 at 4hr	SpO2 at 4hr 15min	SpO2 at 4hr 30min	SpO2 at 4hr 45min	Baseline SBP	Baseline DBP	SBP at 0 min	DBP at 0 min	SBP at 15 min	DBP at 15 min	SBP at 30 min	DBP at 30 min	SBP at 45 min	DBP at 45 min	SBP at 1hr	DBP at 1hr	SBP at 75 min	DBP at 75 min	SBP at 90 min	DBP at 90 mon
1	100	100												102	70	102	68	95	60	96	66	103	72	92	61	118	83	115	81
2	97	96												132	90	130	90	98	60	102	60	90	70	115	60	95	62	90	52
3	99	99												120	74	130	86	149	94	128	84	114	66	124	78	149	79	139	82
4	100	100	99											120	67	134	90	128	75	119	61	146	71	111	60	150	100	140	90
5	100	100	100	100										121	76	132	82	110	66	98	56	102	60	140	98	126	88	114	78
6														120	80	126	86	89	50	94	62	95	61	92	59		80		
7	100	100	100	100	100	100								170	90	180	90	140	80	165	92	145	92	139	89	170	80	130	70
8	97	98												132	78	156	84	121	72	117	64	159	77	152	73	121	63	114	68
9														150	70	159	86	111	72	107	65	125	77	126	76	128	84		
10	97	97												132	76	97	54	104	72	115	70	117	82	118	72	131	92	144	101
11	99													130	74	168	117	118	62	100	57	99	65	111	63	100	55	107	57
12	99	99	99	99	99	99	99							128	86	124	68	103	55	94	48	90	50	86	44	99	57	97	53
13														120	84	128	88	108	76	98	56	100	60	92	50	104	62		
14	99	98	99	99	99	98	99	99	99	98	99	99	99	110	70	142	88	134	82	138	78	138	88	120	74	148	88	130	78
15														112	67	106	58	114	62	113	62	114	72	101	57	120	83	114	82
16														158	92	135	96	125	91	127	90	144	95	124	85	120	92		
17														114	68	124	82	150	99	134	84	103	82	110	74				
18	98	99												110	67	85	51	99	60	154	88	120	88	134	91	121	70	132	68
19	100													124	78	108	57	120	73	118	76	121	69	141	90	123	88	118	76
20														120	80	138	82	125	74	136	78	116	78	126	84	109	68	118	71
21	97													137	92	120	80	106	74	129	83	126	84	140	94	130	88	122	82
22	99	99	100	99										120	82	140	92	128	84	108	74	104	72	102	66	134	79	122	86
23	100	99												120	80	138	89	140	90	110	70	108	68	104	62	118	72	142	90
24	99	99	98	99										110	70	108	68	114	72	112	68	116	70	121	74	118	72	120	76
25														127	90	125	92	132	97	119	80	101	85	125	94	115	64	128	82
26														120	82	134	78	118	70	112	68	114	70	116	72	128	72		
27	98	98												110	70	114	78	104	62	102	60	100	54	110	62	108	68	105	60
28														138	76	140	95	121	78	109	80	121	86	112	72	126	88	131	82
29	99	100												120	80	138	85	112	76	108	58	124	76	118	68	105	66	118	72
30	100													116	74	136	82	142	78	129	76	124	72	128	76	120	74	132	88

S. no.	SBP at 105 min	DBP at 105 min	SBP at 2hr	DBP at 2hr	SBP at 2hr 15min	DBP at 2hr 15min	SBP at 2hr 30 min	DBP at 2hr 30 min	SBP at 2hr 45 min	DBP at 2hr 45min	SBP at 3 hr	DBP at 3 hr	sbp at 3hr 15 min	dbp at 3hr 15min	SBP at 3hr 30 min	DBP at 3hr 30 min	SBP at 3hr 45	DBP at 3hr 45	SBP at 4hr	DBP at 4hr	SBP at 4hr 15 min	DBP at 4hr 15 min	SBP at 4hr 30 min	DBP at 4hr 30 min	SBP at 4hr 45 min	DBP at 4hr 45 min	EtCO2 0 min post inductiio n	EtCO2 at 15 min	EtCO2 at 30 min
1	111	72	120	80																							32	32	32
2	99	46	102	45																							37	34	34
3	136	74	142	81																							38	36	36
4			113	50	130	70																					37	33	32
5	129	86	141	98	129	84	139	88																			36	36	35
6																											33	33	32
7	136	78	140	76	169	90	148	72	159	99	149	90															36	35	36
8	123	66	160	90																							36	32	32
9																											33	32	34
10	151	104	138	92																							33	34	36
11	111	64																									33	36	32
12	120	66	117	62	109	68	106	51	109	68	106	51	106	54													35	35	34
13																											33	32	32
14	109	67	106	66	98	64	99	68	114	74	117	68	121	68	138	90	126	94	104	68	102	67	100	62	98	64	35	34	34
15																											32	33	34
16																											36	35	34
17																											34	36	35
18	140	92	135	89																							32	32	36
19	119	86																									33	33	32
20																											34	33	33
21	120	82																									34	33	33
22	120	82	118	76	119	78	128	82																			34	33	33
23	121	82																									35	35	34
24	118	68	112	80	109	68	124	72																			33	33	34
25																											32	34	35
26																											33	33	33
27	110	74	118	72																							32	33	32
28																											33	36	35
29	128	78	132	82																							33	32	32
30	136	90																									35	36	35

S. no.	EtCO2 at 45 min	EtCO2 at 1hr	EtCO2 at 75 min	EtCO2 at 90 min	EtCO2bat 105min	EtCO2 at 2 hr	EtCO2 at 2hr 15min	EtCO2 at 2hr 30min	EtCO2 at 2hr 45min	EtCO2 at 3hr	EtCO2 at 3hr 15min	EtCO2 at 3hr 30min	EtCO2 at 3hr45min	EtCO2 at 4hr	EtCO2 at 4hr 15min	EtCO2at 4hr 30min	EtCO2 at 4hr 45min	Baseline MAP	Emergence agitation	RASS at 0 min	RASS at 5 min	RASS at 10 min	RASS at 15 min	RASS after 15 min	Duration of Emergence Agitation (minutes)	Complications (if any)
1	32	33	33	33	33	34												81	Y	1	0	0	0	0	1.0	
2	33	32	34	34	35	35												104	Y	2	0	0	0	0	1.0	Desaturation
3	36	35	36	36	35	36												89	Y	2	2	0	0	0	5.0	
4	32	36	33	35	35	36	36											85	Y	2	0	0	0	0	1.0	
5	33	34	33	36	35	35	35	36										91	Y	2	3	2	1	0	15.0	
6	33	32																93	N	0	0	0	0	0		
7	34	34	36	35	35	35	36	35	36	36								117	Y	2	0	0	0	0	1.5	Desaturation
8	34	33	33	34	35	36												96	Y	1	0	0	0	0	0.8	
9	33	33	35															97	N	0	0	0	0	0		
10	35	34	36	35	35	36	36											95	Y	2	2	0	0	0	5.0	
11	32	34	35	34	34	34												93	N	0	0	0	0	0		
12	32	32	33	32	32	33	33	32	33	32	32							100	N	0	0	0	0	0		
13	32	32	32															96	Y	2	0	0	0	0	2.0	
14	34	35	36	35	35	34	34	34	35	35	36	35	35	35	34	34	34	83	N	0	0	0	0	0		
15	32	32	32															82	N	0	0	0	0	0		
16	35	35	36															114	N	0	0	0	0	0		
17	35	36																83	Y	1	0	0	0	0	0.3	
18	35	35	34	35	34	34												81	Y	4	2	0	0	0	5.0	Breath holding spell
19	33	33	35	34	33													93	Y	2	0	0	0	0		
20	32	32	32	32														93	Y	2	1	0	0	0	5.0	
21	33	33	34	33	32													107	N	0	0	0	0	0		
22	32	33	34	33	33	33	33	34										95	N	0	0	0	0	0		
23	34	33	34	34	34	35												93	Y	1	0	0	0	0	0.4	
24	33	33	34	34	33	33	33	34										83	Y	1	0	0	0	0	0.3	
25	33	33	33	32														102	Y	1	0	0	0	0	0.3	
26	34	34	35															95	Y	2	0	0	0	0	0.8	
27	33	33	34	33	33	33												83	Y	1	0	0	0	0	0.3	
28	35	34	34	35														97	Y	1	0	0	0	0	0.5	
29	33	32	32	33	33	34												93	Y	2	2	0	0	0	5.0	
30	34	34	33	34	34													88	Y	1	0	0	0	0	0.5	

S. no.	Intervention done	HR 0 min After extubation	HR 5 min after extubation	HR at 10 min	HR at 15 min	HR after 15 min	SBP 0 min after extubation	SBP at 5 min	SBP at 10 min	SBP at 15 min	SBP after 15 min	DBP 0 min after extubation	DBP at 5 min	DBP at 10 min	DBP at 15 min	DBP after 15 min	SpO2 0 min after extubation SpO2 at 5 min	SpO2 at 5 min	SpO2 at 10 min	SpO2 at 15 min	SpO after 15 min	RR 0 min after extubation	RR at 5 min	RR at 10 min	RR at 15 min	RR after 15 min	Cough
1		128	103	98	90	84	128	128	126	120	121	96	88	80	80	80	99	100	100	100	100	11	12	12	14	18	
2	Oral airway insertion,PPV	105	87	88	90	89	129	140	132	119	124	80	90	88	75	78	91	100	99	99	99	12	14	14	16	18	Present
3		120	116	112	110	102	150	148	134	136	128	88	82	76	78	78	96	98	98	99	98	11	12	12	14	16	Present
4		140	120	110	101	88	151	160	148	134	130	90	68	62	70	70	98	100	100	100	98	12	12	14	14	16	Present
5	Inj. Midazolam 1mg	115	126	114	109	98	149	158	169	148	130	90	78	98	68	70	98	98	96	99	98	12	13	14	14	18	
6		130	134	112	108	92	114	116	112	110	116	77	72	60	74	82	100	100	100	99	98	12	14	14	16	16	
7	Oral airway, Jaw thrust	120	102	101	95	90	178	163	140	150	148	97	95	98	90	94	89	97	99	98	98	14	12	12	14	16	Present
8		112	110	106	104	92	160	153	144	139	128	90	78	68	66	74	97	97	98	98	98	12	12	14	14	16	
9		109	100	98	97	99	150	130	128	116	128	90	70	64	66	70	97	97	96	97	97	12	13	14	16	18	Present
10		106	90	88	87	99	142	160	152	133	128	98	100	98	90	84	97	96	98	96	96	10	11	12	12	16	Present
11		104	85	78	77	76	122	156	144	130	132	73	109	79	68	70	99	100	99	99	99	12	12	14	16	18	
12		110	102	92	80	80	123	115	126	108	110	72	71	72	66	62	97	96	98	97	98	10	12	12	14	18	Present
13		109	98	90	84	82	120	121	114	110	122	82	82	76	68	80	96	97	97	97	97	11	12	12	14	16	Present
14		109	110	108	98	92	116	123	126	126	124	82	86	80	71	70	97	97	97	96	97	11	12	13	14	18	Present
15		110	106	99	92	90	128	133	120	116	110	74	80	80	72	60	99	98	99	99	99	10	11	12	14	15	
16		90	84	86	88	89	140	138	149	150	152	92	96	90	88	78	99	98	98	97	99	11	12	13	16	18	
17		84	88	82	78	76	133	130	120	116	110	91	90	84	74	60	100	100	99	99	99	10	12	12	14	16	
18	Oral airway, Inj. Midazolam 1mg	125	122	118	109	92	148	138	130	128	120	94	98	84	86	70	95	96	97	97	98	11	12	12	14	18	
19		110	105	91	89	78	139	130	123	120	121	92	88	66	67	66	99	98	97	98	97	11	2	13	14	18	Present
20		120	118	111	98	87	150	138	111	110	121	100	82	72	72	70	98	98	99	99	99	10	12	12	14	16	
21		110	105	101	92	84	148	135	128	124	120	98	88	86	72	70	96	97	97	97	98	10	12	12	14	18	Present
22		110	114	100	98	92	132	128	124	120	110	94	86	78	70	70	97	98	98	99	98	10	11	12	14	16	Present
23		112	110	98	70	62	140	130	120	118	110	88	68	74	78	70	99	98	99	98	98	10	12	14	16	18	
24		118	110	108	110	97	128	118	114	110	110	89	86	72	70	70	97	98	98	99	98	11	12	14	16	18	
25		101	92	84	82	78	134	119	120	117	114	92	82	82	82	72	97	98	99	98	98	10	12	14	16	20	Present
26		113	109	104	80	73	130	128	126	114	110	82	78	72	68	72	99	98	99	99	99	11	12	14	16	18	
27		94	90	88	76	72	128	120	118	114	110	88	78	86	72	70	97	98	98	99	98	10	11	12	14	16	Present
28		116	109	100	92	90	150	142	132	121	130	99	98	88	78	80	98	97	98	98	99	11	12	14	16	18	Present
29		118	110	99	92	84	138	128	124	120	110	90	86	76	70	70	98	98	99	98	99	11	12	14	16	18	Present
30		110	108	101	95	78	140	132	124	120	118	92	68	70	70	74	99	98	99	99	99	12	14	14	16	18	

S. no.	MRD No.	Age (in years)	Sex (F=female M=male)	Group	ASA	BMI	Chief complaint	Nasal Blockade	Type of nasal obstruction	Bilateral/ Unilateral	Partial/ Complete	Duration (in months)	Type of Surgery	H/o OSA	Comorbidities if any	Alcohol use	Post-op Headache	Pre-op Nose ache (2hr after packing)	Pre-op Nose ache before shifting to OR	Post-op Nose ache	Pre-op Ear ache 2 hr after packing
31	1525834	33	F	C	II	39	Nasal Blockade	Y	Bilateral, Partial	B	P	3	FESS, Septoturbinoplasty	No	Obese II	N	1			0	
32	1530082	18	M	C	I	22	Nasal Blockade	Y	Bilateral, Partial	B	P	6	Septoturbinoplasty	No	None	N	0			0	
33	438085	35	M	C	II	24.1	Nasal blockade	Y	Bilateral, Partial	B	P	5	Septoturbinoplasty	No	Hypertension	N	0			1	
34	1141215	19	F	C	II	37	Nasal blockade	Y	Unilateral, Partial	U	P	36	FESS, Septoturbinoplasty	No	Obese II	N	0			1	
35	1540971	36	M	C	I	24	Chronic Headache, Nasal Blockade	Y	Unilateral, Partial	U	P	24	FESS, Septoplasty	No	None	N	2			2	
36	1631143	20	M	C	I	21.2	Nasal Blockade	Y	Unilateral, Complete	U	C	12	Septoturbinoplasty	No	None	N	0			2	
37	1395039	23	M	C	I	25.1	Nasal blockade, Anosmia, B/L Ear Heaviness	Y	Unilateral, Partial	U	P	24	Septoturbinoplasty	No	None	N	0			1	
38	1641501	28	M	C	I	18.8	Nasal Blockade, Difficulty breathing	Y	Bilateral, Partial	B	P	2	Septoturbinoplasty	No	None	N	0			2	
39	1654248	31	M	C	I	28.6	Difficulty breathing, mouth breathing	Y	Bilateral, Partial	B	P	36	Septoturbinoplasty	No	None	N	0			3	
40	1659281	29	M	C	I	26.2	Swelling Right eye, Headache	N	None	None	None	0.23333333	FESS	No	None	N	1			2	
41	692399	25	M	C	I	22.4	Nasal blockade	Y	Bilateral, Partial	B	P	12	Septoturbinoplasty	No	None	N	0			2	
42	430181	22	M	C	I	23.6	Nasal blockade, Mouth breathing	Y	Bilateral, Complete	B	C	5	FESS, Septoturbinoplasty	No	None	N	1			1	
43	1645242	60	F	C	II	26	Nasal blockade	Y	Unilateral, complete	U	C	4	FESS, Septoplasty	No	Hypertension	N	0			2	
44	26974	34	F	C	I	24.8	Nasal Blockade	Y	Unilateral, Complete	U	C	12	FESS	No	None	N	0			2	
45	1640779	39	M	C	II	29.1	Nasal Blockade	Y	Unilateral, Complete	U	C	2	FESS, Septoturbinoplasty	No	Hypertension	N	1			1	

S. no.	Pre-op ear ache before shifting to OR	Post-op ear ache	Pre-op Sneezing 2 hr after packing	Pre-op Sneezing before shifting to OR	Post-op Sneezing	Pre-op Difficulty sleeping 2 hr after packing	Pre-op difficulty sleeping before shifting to Or	Post-op Difficulty sleeping	Duration of Surgery (in minutes)	Volume of fluids transfused (in ml)	Estimated blood loss(ml)	Episode of Hypertension	Inj Esmolol given; Total dose	Hypotension	Inj. Ephedrine dose(mg) if given
31		0			0			0	105	1000	60	N		N	
32		0			0			1	105	1000	100	Y	10	N	
33		0			0			0	75	700	50	Y	10	N	
34		0			0			1	105	1000	50	Y	10	N	
35		0			0			1	180	1200	75	N		N	
36		0			0			1	120	1100	75	N		N	
37		0			0			0	65	600	35	N		N	
38		0			0			0	105	900	30	N		N	
39		0			0			1	75	500	30	N		N	
40		0			0			1	120	1000	70	N		N	
41		0			0			0	120	700	70	Y	20	N	
42		0			0			0	90	600	60	N		N	
43		0			0			0	120	700	70	Y	40	N	
44		0			0			0	90	500	50	N		N	
45		0			0			0	120	600	50	Y	40	N	

S. no.	Post operative packing	Baseline HR	HR at 0 min	HR at 15 min	HR at 30 min	HR at 45 min	HR at 1 hr	HR at 75 min	HR at 90 min	HR at 105 min	HR at 2 hr	HR at 2hr 15 min	HR at 2hr 30min	HR at 2hr 45min	HR at 3hr	HR at 3hr 15min	HR at 3hr 30min	HR at 3hr 45min	HR at 4hr	HR at 4hr 15min	HR at 4hr 30min	HR at 4hr 45min	Baseline SpO2	SpO2 at 0 min	SpO2 at 15 min	SpO2 at 30 min	SpO2 at 45 min	SpO2 at 1hr	SpO2 at 75 min	SpO2 at 90 min
31	Bilateral	84	96	108	89	101	98	88	86	97													100	100	99	99	100	100	100	100
32	Bilateral	68	89	78	76	75	80	88	80	76													99	100	100	100	99	99	99	99
33	Bilateral	84	114	109	111	110	119	99															99	100	100	99	99	99	99	
34	Bilateral	72	92	86	88	90	108	101	96	99													98	100	100	100	99	99	99	98
35	Bilateral	60	78	84	80	78	77	76	72	70	72	78	72	70	88								98	100	100	100	98	99	98	98
36	Bilateral	74	92	102	92	87	85	82	84	86	94												99	100	100	100	99	100	100	100
37	Bilateral	74	90	88	87	89	92																100	100	100	100	100	100		
38	Bilateral	72	94	86	84	90	88	86	88	92													99	100	100	99	100	100	100	100
39	Bilateral	76	89	90	86	76	75	80															100	100	99	100	99	99	99	
40	Bilateral	78	90	88	75	76	72	70	74	78	88												98	100	99	99	98	98	99	99
41	Bilateral	68	79	100	94	90	87	96	88	80	74												99	100	100	98	98	97	98	98
42	Bilateral	86	99	90	86	84	89	82	90														100	100	100	99	100	100	99	100
43	Bilateral	92	121	110	96	89	87	88	94	90	97												98	100	99	99	98	99	98	98
44	Bilateral	67	90	78	72	67	68	66	74														100	100	100	99	100	99	99	99
45	Bilateral	78	99	108	102	97	92	89	94	92	88												99	100	100	98	97	98	98	98

S. no.	SpO2 at 105 min	SpO2 at 2hr	SpO2 at 2hr 15min	SpO2 at 2hr 30min	SpO2 at 2hr 45min	SpO2 at 3hr	SpO2 at 3hr 15min	SpO2 at 3hr 30min	SpO2 at 3hr 45min	SpO2 at 4hr	SpO2 at 4hr 15min	SpO2 at 4hr 30min	SpO2 at 4hr 45min	Baseline SBP	Baseline DBP	SBP at 0 min	DBP at 0 min	SBP at 15 min	DBP at 15 min	SBP at 30 min	DBP at 30 min	SBP at 45 min	DBP at 45 min	SBP at 1hr	DBP at 1hr	SBP at 75 min	DBP at 75 min	SBP at 90 min	DBP at 90 mon
31	100													127	76	138	85	127	66	105	53	120	66	122	65	116	72	135	97
32	98													121	68	132	88	128	68	118	60	118	62	128	76	140	90	128	82
33														145	97	121	83	110	72	111	70	113	85	132	89	117	79		
34	99													140	90	100	68	128	72	134	86	136	90	150	92	138	84	130	76
35	98	99	98	98	98	99	99							110	70	124	68	130	70	118	67	110	64	108	62	118	68	121	70
36	99	99	99											114	76	128	88	121	70	116	72	103	68	101	66	110	72	108	70
37														130	80	136	88	112	70	110	68	108	60	106	72				
38	100													110	64	124	78	120	76	108	66	102	66	106	68	110	70	112	68
39														126	78	136	90	108	68	102	74	102	76	110	74	128	76		
40	98	98												108	70	126	78	110	77	112	72	106	70	102	74	110	72	118	74
41	99	98												119	78	130	90	148	95	126	74	120	82	139	90	122	68	119	78
42														127	74	96	59	101	68	118	74	107	78	102	74	112	78	126	75
43	99	97												140	92	150	98	136	88	128	92	134	86	124	76	120	78	132	82
44														126	72	102	67	101	62	100	61	96	52	98	60	106	70	116	72
45	99	98												139	90	156	100	149	95	132	78	121	78	118	74	124	78	130	74

S. no.	SBP at 105 min	DBP at 105 min	SBP at 2hr	DBP at 2hr	SBP at 2hr 15min	DBP at 2hr 15min	SBP at 2hr 30 min	DBP at 2hr 30 min	SBP at 2hr 45 min	DBP at 2hr 45min	SBP at 3 hr	DBP at 3 hr	sbp at 3hr 15 min	dbp at 3hr 15min	SBP at 3hr 30 min	DBP at 3hr 30 min	SBP at 3hr 45	DBP at 3hr 45	SBP at 4hr	DBP at 4hr	SBP at 4hr 15 min	DBP at 4hr 15 min	SBP at 4hr 30 min	DBP at 4hr 30 min	SBP at 4hr 45 min	DBP at 4hr 45 min	EtCO2 0 min post inductiio n	EtCO2 at 15 min	EtCO2 at 30 min
31	138	90																									32	32	32
32	110	64																									33	34	33
33																											34	33	33
34	136	80																									32	33	34
35	110	68	120	72	128	78	129	68	124	70	130	88															32	34	32
36	112	72	118	82																							34	35	35
37																											35	34	34
38	118	76																									36	36	35
39																											35	36	34
40	124	76	128	78																							36	34	34
41	128	74	134	78																							38	37	36
42																											34	33	34
43	151	101	138	99																							37	36	36
44																											35	34	34
45	126	80	138	90																							38	37	36

S. no.	EtCO2 at 45 min	EtCO2 at 1hr	EtCO2 at 75 min	EtCO2 at 90 min	EtCO2bat 105min	EtCO2 at 2 hr	EtCO2 at 2hr 15min	EtCO2 at 2hr 30min	EtCO2 at 2hr 45min	EtCO2 at 3hr	EtCO2 at 3hr 15min	EtCO2 at 3hr 30min	EtCO2 at 3hr45min	EtCO2 at 4hr	EtCO2 at 4hr 15min	EtCO2at 4hr 30min	EtCO2 at 4hr 45min	Baseline MAP	Emergence agitation	RASS at 0 min	RASS at 5 min	RASS at 10 min	RASS at 15 min	RASS after 15 min	Duration of Emergence Agitation (minutes)	Complications (if any)
31	34	34	33	32	33													93	Y	2	0	0	0	0	0.3	
32	34	34	35	34	33													86	Y	2	2	1	0	0	10.0	Removal of nasal packing
33	32	33	33															113	Y	2	1	0	0	0	5.0	
34	34	36	35	35	36													107	Y	2	0	0	0	0	0.5	Removal of nasal packing
35	32	32	32	32	33	32	33	32	33	34	36							83	N	0	0	0	0	0		
36	35	34	33	34	34	34												89	Y	2	2	0	0	0	5.0	
37	34	34																97	Y	2	1	0	0	0	5.0	
38	35	34	34	34	35													79	Y	2	0	0	0	0	0.3	
39	34	33	33															94	N	0	0	0	0	0		
40	33	33	33	34	34	36												83	Y	2	2	0	0	0	5.0	
41	36	35	37	36	36	36												92	Y	2	0	0	0	0	1.0	
42	34	35	34	25														92	Y	1	0	0	0	0	0.5	
43	36	37	36	35	37	36												108	Y	1	0	0	0	0	0.7	
44	34	35	35	36														90	N	0	0	0	0	0		
45	36	36	35	35	36	37												108	Y	2	0	0	0	0	0.8	

S. no.	Intervention done	HR 0 min After extubation	HR 5 min after extubation	HR at 10 min	HR at 15 min	HR after 15 min	SBP 0 min after extubation	SBP at 5 min	SBP at 10 min	SBP at 15 min	SBP after 15 min	DBP 0 min after extubation	DBP at 5 min	DBP at 10 min	DBP at 15 min	DBP after 15 min	SpO2 0 min after extubation SpO2 at 5 min	SpO2 at 5 min	SpO2 at 10 min	SpO2 at 15 min	SpO after 15 min	RR 0 min after extubation	RR at 5 min	RR at 10 min	RR at 15 min	RR after 15 min	Cough
31		120	110	105	92	80	152	142	130	128	116	98	88	70	72	74	97	98	99	98	99	11	12	14	17	20	Present
32		118	116	109	99	76	138	134	128	127	120	90	88	86	82	70	98	98	97	98	99	11	12	14	16	18	Present
33		109	104	98	92	88	142	138	135	130	132	98	90	88	70	76	98	98	97	98	99	10	12	14	15	18	
34		113	92	90	86	76	140	132	135	135	130	92	84	84	86	70	97	97	98	98	98	12	13	15	16	18	
35		109	104	102	98	92	134	128	121	120	110	76	78	76	70	70	97	98	98	98	98	11	12	12	14	18	
36		102	100	88	86	74	128	126	120	121	116	88	84	84	78	74	96	98	98	98	98	10	11	12	12	18	Present
37		110	106	100	100	96	138	132	130	126	121	90	86	80	74	80	96	96	97	98	98	10	11	12	16	18	
38		111	106	100	96	88	130	121	120	110	110	82	76	82	68	70	97	98	98	99	99	11	12	14	16	18	Present
39		94	90	85	82	75	129	122	118	121	118	80	77	76	76	76	98	98	98	99	99	12	14	15	16	20	
40		98	90	88	86	82	138	126	120	124	128	72	75	71	78	76	98	98	98	98	99	12	13	14	15	18	
41		110	112	109	100	78	140	142	128	126	118	98	90	88	80	78	96	97	98	98	98	11	12	14	16	18	Present
42		99	95	90	86	85	136	130	122	120	121	88	70	76	72	80	98	98	97	98	97	12	13	14	16	20	
43		101	110	98	96	92	150	147	140	135	142	98	96	88	78	94	96	97	97	98	98	12	13	16	18	18	Present
44		98	96	92	86	88	128	130	120	121	118	75	72	72	70	72	98	98	98	99	98	11	13	14	15	16	
45		118	112	104	100	90	152	148	140	142	138	95	90	96	95	90	96	97	97	97	98	12	12	14	16	18	Present

S. no.	MRD No.	Age (in years)	Sex (F=female M=male)	Group	ASA	BMI	Chief complaint	Nasal Blockade	Type of nasal obstruction	Bilateral/ Unilateral	Partial/ Complete	Duration (in months)	Type of Surgery	H/o OSA	Comorbidities if any	Alcohol use	Overnight vitals(in S group) HR 4hr after packing	HR (6 hr after packing)	HR (8hr)	HR (10 hr)	HR (12hr)	SBP (4hr)	DBP(4hr)	SBP (6hr)
1	1423404	28	M	S	I	24.2	Nasal blockade	Y	Bilateral, Partial	B	P	4	Septoturbinoplasty	No	None	N	84	86	94	94	88	130	80	130
2	1431821	27	M	S	I	28.5	Nasal blockade	Y	Unilateral, Complete	U	C	84	Septoturbinoplasty	No	None	N	74	72	70	68	69	128	76	120
3	1320677	33	M	S	II	23.8	PND, Nasal bleed, Nasal Obstruction	Y	Bilateral, Partial	B	P	5	FESS, Septoplasty	No	Hypertension	N	104	102	100	88	84	120	90	130
4	1420356	58	M	S	I	24.9	Nasal blockade	Y	Bilateral, Partial	B	P	7	Septoturbinoplasty	No	None	N	88	86	87	86	84	130	90	132
5	1408693	26	M	S	I	27.8	Nasal blockade, mild respiratory discomfort	Y	Unilateral, Complete	U	C	5	FESS, Septoturbinoplasty	Yes	None	N	92	88	84	78	84	130	70	120
6	1462392	19	M	S	I	22	Nasal blockade, Left proptosis	Y	Bilateral, Complete	B	C	1	FESS	No	None	N	88	89	86	82	94	110	70	110
7	1356045	35	M	S	I	20.9	Nasal blockade	Y	Bilateral, Partial	B	P	12	Septoturbinoplasty	No	None	N	86	86	87	84	88	130	80	132
8	1465195	23	M	S	I	27.8	Nasal Blockade	Y	Unilateral, Complete	U	C	48	Septoturbinoplasty	No	None	N	86	86	84	85	84	140	80	140
9	187684	31	M	S	I	26.8	Nasal Blockade	Y	Unilateral, Complete	U	C	24	Septoturbinoplasty	No	None	N	86	82	81	76	80	116	74	120
10	1492968	44	F	S	II	27.2	Nasal blockade, recurrent sinusitis	Y	Bilateral, Partial	B	P	12	FESS	No	Vertigo, orthostatic hypotension	N	80	78	76	75	79	100	70	100
11	1051976	38	M	S	II	24.5	Sinusitis, Nasal blockade	Y	Bilateral, Partial	B	P	4	FESS, Septoplasty	No	None	Y	88	86	80	82	80	110	70	110
12	1493821	33	M	S	II	18.5	Nasal blockade, Pain Left eye & forehead	Y	Bilateral, Partial	B	P	6	FESS	No	None	Y	82	80	84	78	74	110	70	120
13	1497149	60	M	S	II	27	Nasal blockade	Y	Bilateral, Partial	B	P	6	FESS	No	None	Y	74	76	70	74	78	120	70	110
14	1263714	42	M	S	I	26.8	Recurrent Sinusitis, Nasal Blockade	Y	Unilateral, Partial	U	P	24	Septoturbinoplasty	No	None	Y	72	68	68	70	74	120	80	124
15	1490722	40	M	S	I	29.3	Nasal Blockade	Y	Unilateral, Partial	U	P	6	Septoturbinoplasty	No	HCV positive	N	92	82	78	68	62	140	90	130
16	296508	21	M	S	I	24.2	Recurrent sore Throat, PND, Nasal blockade	Y	Unilateral, Partial	U	P	24	FESS	No	None	N	78	72	78	74	76	110	70	120
17	1507492	36	M	S	I	27.1	Nasal Blockade	Y	Bilateral, Partial	B	P	5	Septoturbinoplasty	No	None	N	76	80	80	82	86	120	80	110
18	1517483	18	M	S	I	21	Nasal blockade, Throat pain, Post nasal discharge	Y	Bilateral, Partial	B	P	36	Septoturbinoplasty	No	None	N	80	78	76	74	82	110	70	120
19	909184	46	M	S	II	32	Nasal Blockade	Y	Bilateral, Partial	B	P	0	Septoturbinoplasty	No	Obese I	Y	76	84	86	88	70	140	80	130
20	1490266	33	M	S	II	23.7	External deformity	N	None	None	None	0	Septorhinoplasty	No	Hypertension	Y	84	86	80	82	86	140	70	130
21	1521771	33	M	S	I	31	Nasal blockade, Mouth breathing	Y	Bilateral, Complete	B	C	60	FESS	No	Obese I	N	78	76	77	74	80	120	80	110
22	1521718	44	F	S	II	24	Nasal Blockade, Cough	Y	Bilateral, Partial	B	P	6	FESS	No	COPD	N	86	82	80	76	80	130	90	120
23	1519023	32	M	S	I	30.4	Nasal Blockade	Y	Unilateral, Partial	U	P	1	FESS, Septoturbinoplasty	No	Obese I	N	70	72	67	68	72	120	70	110
24	1540480	25	F	S	I	23.5	Nasal blockade, Excessive sneezing, Headache	Y	Unilateral, Complete	U	C	1.5	FESS	No	None	N	110	102	98	97	102	114	70	120
25	1595151	36	M	S	I	23.2	Nasal blockade	Y	Bilateral, Partial	B	P	3	FESS, Septoplasty	No	None	N	70	68	72	66	76	110	60	114
26	1314860	48	M	S	II	24.7	Nasal bleeding	N	None	None	None	0.066666667	FESS	No	Hypertension	Y	80	84	85	76	82	140	90	138
27	1641439	32	M	S	I	30	Nasal Blockade	Y	Bilateral, Partial	B	P	6	FESS, Septoturbinoplasty	No	None	N	88	82	83	84	82	120	80	116
28	1535200	32	F	S	II	24	Nasal Blackade	Y	Bilateral, Partial	B	P	3	FESS	No	Asthma	N	94	92	86	87	84	118	78	116
29	1646372	47	F	S	I	26.1	Nasal blackade	Y	Bilateral, Partial	B	P	5	FESS	No	None	N	86	87	86	88	85	110	72	118
30	1626122	29	M	S	I	24	Nasal blockade	Y	Bilateral, Partial	B	P	24	FESS	No	None	N	72	74	70	68	78	124	82	116
31	1653241	21	M	S	I	24.1	Nasal blockade, posterior nasal discharge	Y	Unilateral, Complete	U	C	48	FESS, Septoturbinoplasty	No	None	N	68	67	70	66	69	110	76	114
32	1658957	30	M	S	II	29	Right eye swelling, Right nasal blockade	Y	Unilateral, Partial	U	P	1	FESS	No	T2DM	Y	92	87	86	85	88	132	74	130
33	1659444	30	M	S	I	23	Difficulty breathing, Nasal blockade	Y	Bilateral, Partial	B	P	18	Septoturbinoplasty	No	None	N	82	80	78	77	84	132	70	130

S. no.	DBP(6hr)	SBP (8hr)	DBP(8hr)	SBP (10hr)	DBP(10hr)	SBP (12hr)	DBP(12hr)	SpO2 (4hr)	SpO2 (6hr)	SpO2 (8hr)	SpO2 (10hr)	SpO2 (12hr)	Tolerance for packing (Yes/No)	If No, hours after which packing was removed)	Pre-op Headache (2hr after packing)	Pre-op Headache before shifting to OR	Post-op Headache	Pre-op Nose ache (2hr after packing)	Pre-op Nose ache before shifting to OR	Post-op Nose ache
1	70	120	70	120	80	124	82	98	98	97	97	97	Yes		1	1	0	1	1	2
2	80	114	66	116	70	121	68	98	98	97	98	98	Yes		0	0	0	0	0	1
3	80	130	60	120	70	130	80	97	97	98	98	98	Yes		0	0	0	2	1	2
4	71	128	76	120	64	116	68	98	97	97	98	97	Yes		0	0	0	0	0	0
5	80	110	70	120	80	130	70	97	97	98	97	97	Yes		0	0	0	0	0	0
6	70	104	68	108	70	110	70	98	97	97	97	97	Yes		0	0	2	0	0	2
7	78	124	76	120	80	131	78	97	97	98	97	98	Yes		0	0	1	0	0	0
8	80	130	70	130	70	130	70	97	96	96	97	96	Yes		0	0	0	0	0	1
9	80	116	70	110	70	114	68	99	98	98	99	99	Yes		0	0	0	0	0	2
10	70	110	72	100	60	112	64	100	99	98	99	99	Yes		0	0	0	0	0	2
11	70	110	70	120	80	120	80	97	97	98	98	98	Yes		0	0	0	0	0	0
12	80	110	70	110	70	120	70	98	98	99	98	98	Yes		0	0	0	0	0	1
13	70	110	70	120	70	120	70	97	98	97	97	98	Yes		0	0	0	0	0	0
14	72	110	74	126	72	110	70	99	98	98	98	99	Yes		0	0	0	0	0	1
15	80	120	70	130	80	120	60	97	98	98	97	98	Yes		0	0	0	0	0	1
16	80	120	80	110	70	110	70	98	98	97	98	98	Yes		0	0	0	0	0	1
17	70	110	70	120	80	120	80	97	97	98	98	98	Yes		0	0	0	0	0	2
18	80	120	80	110	80	120	70	99	98	99	98	99	Yes		0	0	0	0	0	2
19	84	140	80	130	70	120	80	98	97	98	97	98	Yes		0	0	0	0	0	0
20	80	120	70	118	74	114	68	97	98	98	98	98	Yes		0	0	1	0	0	1
21	70	118	77	116	74	128	84	97	98	98	99	99	Yes		0	0	0	0	0	1
22	80	120	80	130	80	140	80	98	98	97	97	98	Yes		0	0	0	0	0	0
23	70	121	80	110	70	124	72	99	98	98	99	99	Yes		0	0	0	0	0	0
24	60	121	76	110	70	114	68	99	98	98	99	98	Yes		0	0	0	0	0	0
25	64	108	62	110	68	118	70	99	99	99	99	99	Yes		0	0	0	0	0	1
26	82	130	80	142	92	134	86	97	97	97	96	97	Yes		0	0	0	1	1	2
27	74	124	76	116	70	121	78	96	96	97	97	97	Yes		0	0	0	0	0	0
28	72	110	70	112	72	110	70	98	98	97	98	99	Yes		0	0	0	0	0	2
29	70	116	74	120	78	124	76	99	99	100	99	99	Yes		0	0	0	0	0	1
30	78	120	80	110	76	126	80	99	99	99	98	99	Yes		0	0	0	0	0	0
31	74	118	76	108	76	111	77	99	99	99	99	99	Yes		0	0	0	0	0	0
32	68	124	70	128	80	124	74	97	97	96	97	97	Yes		0	0	0	1	1	2
33	68	128	70	120	70	134	78	100	99	98	98	99	Yes		0	0	0	0	0	1

S. no.	Pre-op Ear ache 2 hr after packing	Pre-op ear ache before shifting to OR	Post-op ear ache	Pre-op Sneezing 2 hr after packing	Pre-op Sneezing before shifting to OR	Post-op Sneezing	Pre-op Difficulty sleeping 2 hr after packing	Pre-op difficulty sleeping before shifting to Or	Post-op Difficulty sleeping	Duration of Surgery (in minutes)	Volume of fluids transfused (in ml)	Estimated blood loss(ml)	Episode of Hypertension	Inj Esmolol given; Total dose	Hypotension
1	0	0	0	2	1	0	2	2	0	135	1000	150	N		N
2	0	0	0	0	0	0	0	0	0	135	1200	100	Y	20	N
3	0	0	0	1	0	0	2	1	1	120	1200	100	Y	30	N
4	0	0	0	0	0	0	0	0	0	105	1100	75	N		N
5	0	0	0	0	0	0	0	0	0	90	800	30	Y	20	N
6	0	0	0	0	0	0	0	0	0	150	1100	200	Y	40	N
7	0	0	0	0	0	0	0	0	0	135	1100	100	Y	40	N
8	0	0	0	0	0	0	0	0	0	70	800	50	Y	20	N
9	0	0	0	0	0	0	0	0	1	120	800	70	Y	20	N
10	0	0	0	0	0	0	0	0	0	140	1200	100	N		N
11	0	0	0	0	0	0	0	0	0	210	1000	100	Y	10	N
12	0	0	0	0	0	0	0	0	0	90	800	75	Y	10	N
13	0	0	0	0	0	0	0	0	0	150	900	100	Y	20	N
14	0	0	0	0	0	0	0	0	0	120	1100	75	N		N
15	0	0	0	0	0	0	0	0	0	105	1200	100	Y	10	N
16	0	0	0	0	0	0	0	0	0	110	900	75	N		N
17	0	0	0	0	0	0	0	0	0	135	1000	200	Y	20	N
18	0	0	0	0	0	0	0	0	0	90	1100	50	N		N
19	0	0	0	0	0	0	0	0	0	105	1100	50	N		N
20	0	0	0	0	0	0	0	0	0	180	2000	100	Y	50	N
21	0	0	0	0	0	0	0	0	0	150	1500	200	Y	30	N
22	0	0	0	0	0	0	0	0	0	120	700	50	N		N
23	0	0	0	0	0	0	0	0	0	120	1000	75	N		N
24	0	0	0	0	0	0	0	0	0	90	800	50	N		N
25	0	0	0	0	0	0	0	0	0	135	1100	75	N		N
26	0	0	0	0	0	0	0	0	0	75	800	80	Y	10	N
27	0	0	0	0	0	0	0	0	0	120	1100	70	N		N
28	0	0	0	0	0	0	0	0	0	165	1200	75	Y	30	N
29	0	0	0	0	0	0	0	0	0	95	700	40	Y	10	N
30	0	0	0	0	0	0	0	0	0	120	1000	50	N		N
31	0	0	0	0	0	0	0	0	0	135	1100	70	N		N
32	0	0	0	0	0	0	0	0	0	150	1200	80	Y	20	N
33	0	0	0	0	0	0	0	0	0	90	800	50	N		N

S. no.	Inj. Ephedrine dose(mg) if given	Post operative packing	Baseline HR	HR at 0 min	HR at 15 min	HR at 30 min	HR at 45 min	HR at 1 hr	HR at 75 min	HR at 90 min	HR at 105 min	HR at 2 hr	HR at 2hr 15 min	HR at 2hr 30min	HR at 2hr 45min	HR at 3hr	HR at 3hr 15min	HR at 3hr 30min	HR at 3hr 45min	HR at 4hr	HR at 4hr 15min	HR at 4hr 30min	HR at 4hr 45min	Baseline SpO2	SpO2 at 0 min	SpO2 at 15 min	SpO2 at 30 min	SpO2 at 45 min	SpO2 at 1hr	SpO2 at 75 min
1		Bilateral	80	99	97	94	92	94	99	94	97	91	92											100	100	100	99	100	100	99
2		Bilateral	78	94	79	68	99	80	82	111	90	84	92	94	99	100								100	100	99	99	100	100	99
3		Bilateral	88	100	98	79	82	90	100	100	96	113												99	100	100	99	99	99	100
4		Bilateral	100	109	92	81	86	83	83	86	113													99	99	99	99	99	98	98
5		Bilateral	88	104	99	114	116	99	112	113														98	100	99	98	98	98	98
6		Bilateral	103	109	98	98	106	87	99	94	98	102	113	113										99	100	99	99	99	99	99
7		Bilateral	88	110	105	92	107	111	92	109	110	102	114											97	99	99	99	99	100	99
8		Bilateral	78	102	108	91	89	92	92	92	96													96	99	98	97	96	95	95
9		Bilateral	90	108	95	98	119	108	96	98	92	89												100	100	99	100	100	99	99
10		Bilateral	84	95	88	86	87	88	84	88	87	89	96											100	100	100	100	100	100	100
11		Bilateral	86	100	116	110	98	94	108	102	98	90	88	89	92	116	118	120						98	99	99	99	99	99	100
12		Bilateral	100	108	104	103	106	112	110															99	100	100	99	99	99	99
13		Bilateral	78	110	75	72	73	73	80	72	73	74	74	74										98	99	99	99	99	99	98
14		Bilateral	82	78	74	72	72	76	78	82	84	90												98	99	99	99	99	99	99
15		Bilateral	80	106	98	97	98	97	102	84	98													97	98	97	98	97	97	97
16		Bilateral	86	92	84	82	80	84	84	82	80													100	100	100	99	99	99	99
17		Bilateral	78	94	92	90	92	96	90	92	92	92	94											98	100	100	100	99	99	99
18		Bilateral	70	84	72	68	67	68	76	78														98	100	99	98	98	99	98
19		Bilateral	70	68	64	63	67	63	62	63	74													98	100	97	97	96	97	97
20		Bilateral	82	92	88	88	84	82	94	89	84	94	90	88	86	98								99	100	100	100	100	99	99
21		Bilateral	98	108	94	101	104	102	98	92	90	101	98	98										98	100	100	100	100	100	98
22		Bilateral	83	90	84	78	76	78	74	72	73	82												99	100	100	100	99	99	99
23		Bilateral	65	97	93	79	79	74	70	68	84	110												99	100	99	99	99	99	98
24		Bilateral	108	110	123	107	103	108	100	98														100	100	97	97	97	98	97
25		Bilateral	80	109	116	98	88	86	90	86	99	90	105											99	100	100	99	99	99	98
26		Bilateral	92	120	112	108	98	97	100															99	99	98	98	98	98	98
27		Bilateral	95	90	85	87	85	82	92	90	88	92												99	100	100	98	99	98	99
28		Bilateral	98	118	110	101	98	96	97	99	96	97	92	100	101									100	100	100	99	100	99	100
29		Bilateral	87	99	101	96	94	90	110	104														98	100	99	99	99	99	98
30		Bilateral	94	104	100	98	96	87	88	87	90	99												96	99	98	97	98	98	97
31		Bilateral	70	92	88	80	68	69	70	67	68	72	79											100	100	99	100	100	100	99
32		Bilateral	94	110	108	100	96	92	82	98	86	88	90	94										96	99	98	97	97	97	97
33		Bilateral	84	104	100	92	86	82	80	86														99	100	100	99	100	100	99

S. no.	SpO2 at 90 min	SpO2 at 105 min	SpO2 at 2hr	SpO2 at 2hr 15min	SpO2 at 2hr 30min	SpO2 at 2hr 45min	SpO2 at 3hr	SpO2 at 3hr 15min	SpO2 at 3hr 30min	SpO2 at 3hr 45min	SpO2 at 4hr	SpO2 at 4hr 15min	SpO2 at 4hr 30min	SpO2 at 4hr 45min	Baseline SBP	Baseline DBP	SBP at 0 min	DBP at 0 min	SBP at 15 min	DBP at 15 min	SBP at 30 min	DBP at 30 min	SBP at 45 min	DBP at 45 min	SBP at 1hr	DBP at 1hr	SBP at 75 min	DBP at 75 min	SBP at 90 min	DBP at 90 mon
1	99	100	100	100											124	80	131	70	127	94	113	68	119	70	122	81	133	93	129	90
2	99	100	99	100											124	68	134	72	110	62	102	60	154	90	128	76	118	68	158	92
3	100	99	100												114	79	139	82	120	68	102	68	104	70	124	86	149	100	139	90
4	98	98													109	71	100	63	90	51	87	50	112	62	93	49	93	45	97	57
5	98														130	74	128	72	104	66	138	89	150	91	128	78	156	94	138	88
6	99	99	99	99	99										109	63	120	68	92	56	108	68	124	88	115	69	133	69	96	61
7	99	99	99	99											131	76	148	84	157	108	135	89	111	72	149	108	138	101	128	90
8	95	95													135	73	171	101	121	52	130	60	115	56	110	52	119	64	130	70
9	99	100	100												124	67	132	72	129	72	130	80	152	94	128	84	132	76	150	90
10	100	100	100	100											106	71	108	70	105	70	110	72	109	68	114	74	120	82	126	78
11	100	99	99	99	99	99	100	99	98						120	80	135	90	111	74	104	86	107	78	104	86	120	84	121	83
12															121	76	108	66	120	72	132	86	129	82	149	101	138	92		
13	99	98	98	98	99										127	84	98	62	89	56	90	59	124	76	120	79	140	90	130	82
14	99	99	99												120	80	104	70	106	68	110	70	114	76	110	74	118	82	120	84
15	97	96													150	90	128	86	124	80	130	87	131	82	128	82	139	88	124	91
16	99	98													124	80	130	82	128	80	124	76	120	68	131	74	128	78	129	76
17	100	99	99	100											130	80	148	94	134	78	132	68	128	78	140	90	126	74	132	72
18	99	98													117	68	109	76	107	64	108	64	110	70	121	74	130	84	138	90
19	97	98													120	80	96	52	98	50	101	62	104	64	101	60	98	56	97	53
20	98	98	98	97	98	98	98								128	72	144	90	132	88	148	100	132	96	130	88	150	92	136	78
21	99	99	99	99	99										130	90	148	99	136	88	142	82	160	100	150	90	124	88	108	60
22	99	98	99												137	89	128	84	118	78	116	68	108	84	110	62	108	60	114	70
23	99	99	99												142	93	137	91	135	80	125	66	113	78	111	72	110	70	113	70
24	97														112	68	121	74	90	60	93	55	93	65	104	68	93	59	102	66
25	99	99	98	98											120	76	139	92	121	76	108	72	104	68	108	66	112	70	109	70
26															138	86	150	94	128	84	121	82	116	76	120	82	130	88		
27	99	99	99	98											125	88	136	80	114	74	108	68	102	66	102	64	111	74	118	70
28	100	99	99	99	99	99	99								120	80	141	92	132	90	128	88	118	80	116	76	116	78	112	68
29	99														112	68	136	88	127	76	129	84	130	88	146	94	132	89	128	86
30	97	96	97												127	84	139	92	126	84	118	78	111	77	110	76	120	78	118	80
31	99	99	100	99											111	70	130	84	126	78	105	68	104	64	102	60	100	72	101	61
32	96	97	97	97	99										139	92	150	95	142	92	130	82	124	80	122	78	140	90	148	95
33	100														136	85	142	95	116	68	108	80	104	78	110	77	114	76	128	73

S. no.	SBP at 105 min	DBP at 105 min	SBP at 2hr	DBP at 2hr	SBP at 2hr 15min	DBP at 2hr 15min	SBP at 2hr 30 min	DBP at 2hr 30 min	SBP at 2hr 45 min	DBP at 2hr 45min	SBP at 3 hr	DBP at 3 hr	sbp at 3hr 15 min	dbp at 3hr 15min	SBP at 3hr 30 min	DBP at 3hr 30 min	SBP at 3hr 45	DBP at 3hr 45	SBP at 4hr	DBP at 4hr	SBP at 4hr 15 min	DBP at 4hr 15 min	SBP at 4hr 30 min	DBP at 4hr 30 min	SBP at 4hr 45 min	DBP at 4hr 45 min	EtCO2 0 min post inductiio n	EtCO2 at 15 min	EtCO2 at 30 min	EtCO2 at 45 min
1	126	85	120	88	129	80																					36	35	36	32
2	132	78	124	68	148	80																					36	32	33	32
3	128	92	134	76																							36	36	33	33
4	147	68																									32	33	35	35
5																											34	33	34	36
6	131	71	111	42	120	84	110	60																			33	36	36	35
7	138	92	124	88	128	99																					35	36	33	32
8	160	72																									36	36	35	35
9	138	84	132	78																							34	32	32	36
10	124	80	130	78	131	72																					33	34	33	32
11	118	82	116	74	109	73	124	78	130	78	136	89	140	101		88											32	33	32	32
12																											32	33	33	33
13	128	84	129	86	141	82	130	82																			33	32	33	32
14	123	86	128	88																							33	33	34	33
15	109	72																									33	33	33	33
16	120	82																									34	33	33	33
17	130	70	136	80	138	92																					35	34	34	34
18																											33	34	34	35
19	110	76																									33	33	34	34
20	132	78	148	90	136	78	138	70	132	78	146	94															34	34	35	34
21	102	68	114	72	128	76	129	80																			35	34	35	35
22	109	68	128	78																							33	34	33	33
23	136	85	140	92																							34	34	34	32
24																											32	32	33	32
25	110	70	118	72	126	80																					35	36	35	34
26																											35	36	35	35
27	120	76	126	78																							35	34	34	34
28	110	70	121	72	118	80	124	84	130	86																	37	36	36	35
29																											36	35	36	35
30	128	78	126	74																							34	35	34	35
31	98	59	108	70	110	74																					36	35	34	34
32	136	88	128	78	130	76	142	98																			37	38	37	36
33																											36	36	35	35

S. no.	EtCO2 at 1hr	EtCO2 at 75 min	EtCO2 at 90 min	EtCO2bat 105min	EtCO2 at 2 hr	EtCO2 at 2hr 15min	EtCO2 at 2hr 30min	EtCO2 at 2hr 45min	EtCO2 at 3hr	EtCO2 at 3hr 15min	EtCO2 at 3hr 30min	EtCO2 at 3hr45min	EtCO2 at 4hr	EtCO2 at 4hr 15min	EtCO2at 4hr 30min	EtCO2 at 4hr 45min	Baseline MAP	Emergence agitation	RASS at 0 min	RASS at 5 min	RASS at 10 min	RASS at 15 min	RASS after 15 min	Duration of Emergence Agitation (minutes)	Complications (if any)	Intervention done
1	33	34	33	33	33	34											95	Y	2	0	0	0	0	1.0		
2	35	35	36	35	34	34											87	N	0	0	0	0	0			
3	34	36	36	35	35												91	N	0	0	0	0	0			
4	33	34	35														84	N	0	0	0	0	0			
5	35	36	36														93	Y	2	1	0	0	0	5.0	Breath holding spell	Oral airway, jaw thrust
6	35	35	34	35	36	36	35										78	N	0	0	0	0	0			
7	34	33	34	34	33	34											94	N	0	0	0	0	0			
8	35	36	36	36													94	N	0	0	0	0	0			
9	35	34	34	34	33												86	N	0	0	0	0	0			
10	32	34	33	33	35	36											83	N	0	0	0	0	0			
11	33	32	33	34	33	32	34	33	33	34	33						93	N	0	0	0	0	0			
12	34	35															91	N	0	0	0	0	0			
13	32	33	32	32	32	32	32										98	N	0	0	0	0	0			
14	33	34	33	34	34												93	N	0	0	0	0	0			
15	33	32	32	32													110	Y	2	1	0	0	0	5.0		
16	33	34	33	33													95	N	0	0	0	0	0			
17	35	34	33	33	34	34											97	N	0	0	0	0	0			
18	34	35	34														84	N	0	0	0	0	0			
19	33	33	33	34													93	N	0	0	0	0	0			
20	34	35	34	34	35	36	34	35	36								88	N	0	0	0	0	0			
21	36	36	36	35	36	35	35										103	N	0	0	0	0	0			
22	33	32	33	33	34												105	N	0	0	0	0	0			
23	32	32	32	33	34												109	N	0	0	0	0	0			
24	32	32	33														83	N	0	0	0	0	0			
25	34	33	34	34	33	35											91	N	0	0	0	0	0			
26	34	35															103	Y	1	0	0	0	0	0.5		
27	33	34	34	35	36												100	N	0	0	0	0	0			
28	35	35	34	34	34	34	34	35	35								93	Y	1	0	0	0	0	0.7		
29	37	36	37														83	N	0	0	0	0	0			
30	35	35	33	35	36												98	N	0	0	0	0	0			
31	33	34	34	33	33	34											84	N	0	0	0	0	0			
32	36	35	36	35	36	37	36										108	N	0	0	0	0	0			
33	34	34	34														102	N	0	0	0	0	0			

S. no.	HR 0 min After extubation	HR 5 min after extubation	HR at 10 min	HR at 15 min	HR after 15 min	SBP 0 min after extubation	SBP at 5 min	SBP at 10 min	SBP at 15 min	SBP after 15 min	DBP 0 min after extubation	DBP at 5 min	DBP at 10 min	DBP at 15 min	DBP after 15 min	SpO2 0 min after extubation SpO2 at 5 min	SpO2 at 5 min	SpO2 at 10 min	SpO2 at 15 min	SpO after 15 min	RR 0 min after extubation	RR at 5 min	RR at 10 min	RR at 15 min	RR after 15 min	Cough
1	131	110	105	99	98	130	128	150	140	130	90	83	90	90	80	98	99	100	100	98	12	14	16	16	18	Present
2	112	110	108	100	82	148	140	124	122	124	80	81	62	76	76	98	99	100	99	99	12	12	13	15	18	
3	112	108	106	102	102	135	159	149	149	139	90	113	100	102	90	100	98	100	99	99	10	12	13	14	18	Present
4	125	98	98	89	85	147	161	140	142	136	85	78	72	78	68	98	97	97	97	97	10	12	12	14	18	Present
5	114	112	109	104	92	148	150	132	128	112	92	91	68	64	62	97	96	97	98	97	11	11	13	14	18	Present
6	114	108	104	96	98	109	110	90	120	121	68	71	60	68	70	97	98	97	98	98	11	12	12	14	16	Present
7	118	110	120	116	104	170	150	130	138	132	100	101	82	80	86	97	99	98	99	100	11	11	13	14	16	Present
8	111	98	84	80	112	144	134	132	130	134	75	71	64	60	84	96	96	96	96	97	11	12	13	12	16	
9	110	108	105	100	82	148	136	130	132	120	89	87	80	68	80	98	99	99	99	100	11	12	12	14	16	Present
10	99	101	92	86	82	134	126	123	116	110	76	77	86	70	70	97	98	99	99	99	11	12	12	14	16	
11	121	108	84	78	76	104	110	114	126	120	72	73	76	78	80	97	97	99	97	98	12	13	14	16	18	Present
12	120	110	108	90	84	140	132	128	120	110	90	71	72	80	70	97	99	99	98	97	10	11	13	14	18	Present
13	90	87	80	78	74	150	148	138	128	120	100	95	82	64	80	98	98	99	99	97	11	12	12	14	18	Present
14	98	90	82	78	76	134	128	120	110	110	90	89	70	70	70	97	98	98	98	98	11	12	14	16	20	
15	120	118	109	104	88	120	148	130	134	128	100	82	80	78	84	97	98	97	98	98	10	11	12	14	18	
16	89	88	70	68	66	128	120	110	118	118	76	73	70	64	74	99	99	98	98	99	11	12	14	14	16	Present
17	100	94	92	90	86	148	136	132	130	120	89	81	78	80	80	97	98	98	98	98	11	12	14	16	18	
18	88	90	84	70	63	150	148	130	128	123	90	87	80	70	64	97	98	98	99	99	11	12	14	16	18	
19	92	90	88	84	80	160	148	130	128	132	90	91	80	84	84	97	98	97	98	98	11	12	14	14	18	Present
20	101	100	98	90	86	158	148	135	128	114	99	73	78	68	70	97	98	97	97	98	10	12	15	16	18	
21	101	110	98	96	86	155	138	128	130	121	92	73	84	80	68	97	97	98	99	98	10	12	14	16	20	
22	90	92	88	84	88	130	137	134	130	130	84	93	88	80	70	100	98	99	99	99	12	12	14	16	18	
23	116	110	93	92	78	160	150	135	128	120	100	93	78	68	70	98	98	99	97	99	12	12	14	16	18	
24	114	110	111	106	102	110	121	126	120	116	68	73	78	70	68	100	100	99	98	99	10	11	12	14	16	
25	120	118	112	102	101	129	126	114	120	118	78	77	70	76	70	98	98	99	99	99	11	12	12	14	18	
26	126	120	111	102	97	138	132	126	132	134	99	87	82	82	84	97	97	98	98	98	11	12	12	14	18	
27	100	95	96	90	91	130	128	126	124	118	88	83	84	76	70	98	97	98	97	97	12	14	14	16	18	
28	120	116	100	98	96	140	136	128	124	120	94	79	75	72	82	98	97	98	98	98	12	12	14	14	16	
29	106	102	96	90	88	128	126	118	110	120	88	77	78	74	70	98	97	98	98	98	12	14	15	16	18	
30	108	104	99	96	85	145	136	128	122	120	92	81	76	74	72	98	97	97	98	98	11	12	14	16	18	
31	90	92	88	87	70	130	122	118	111	112	76	73	68	74	62	97	98	98	98	99	11	12	14	16	18	
32	110	112	104	101	96	148	140	134	132	136	99	98	89	76	78	97	97	98	98	98	10	12	14	16	18	Present
33	100	92	88	84	82	140	136	128	121	120	92	81	70	76	72	98	98	98	99	99	11	12	14	16	17	

S. no.	MRD No.	Age (in years)	Sex (F=female M=male)	Group	ASA	BMI	Chief complaint	Nasal Blockade	Type of nasal obstruction	Bilateral/ Unilateral	Partial/ Complete	Duration (in months)	Type of Surgery	H/o OSA	Comorbidities if any	Alcohol use	Overnight vitals(in S group) HR 4hr after packing	HR (6 hr after packing)	HR (8hr)	HR (10 hr)	HR (12hr)	SBP (4hr)	DBP(4hr)	SBP (6hr)
34	1658464	25	M	S	I	20	Nasal blockade	Y	Bilateral, Partial	B	P	12	FESS, Septoturbinoplasty	No	None	N	76	75	77	78	82	110	77	111
35	1633828	32	M	S	I	28	Nasal blockade	Y	Unilateral, Partial	U	P	24	Septoturbinoplasty	No	None	N	88	87	90	92	90	128	78	130
36	1658386	28	F	S	I	27.5	Nasal blockade	Y	Bilateral, Partial	B	P	18	Septoturbinoplasty	No	None	N	78	80	78	72	82	110	74	116
37	1649103	38	M	S	I	25.2	Foul smelling PND	N	None	None	None	0.233333333	FESS	No	None	N	72	76	70	68	74	130	70	122
38	1651781	35	M	S	I	25.4	Nasal blockade	Y	Unilateral, Complete	U	C	2	FESS	No	None	N	87	89	92	87	88	117	76	114
39	1659444	30	M	S	I	26.7	Nasal blockade	Y	Unilateral, Partial	U	P	3	Septoturbinoplasty	No	None	N	70	72	74	71	76	121	80	124
40	908957	31	F	S	II	28	Nasal blockade, Excessive sneezing	Y	Bilateral, Partial	B	P	6	FESS, Septoplasty	No	Hypothyroidism	N	89	92	90	94	88	112	68	116
41	1721947	21	M	S	I	26	Nasal blockade	Y	Bilateral, Partial	B	P	5	FESS	No	None	N	72	74	74	78	76	112	72	110
42	1726969	21	M	S	I	24.2	Nasal blockade	Y	Unilateral, Partial	U	P	12	Septoturbinoplasty	No	None	N	87	92	88	87	89	126	82	128
43	1729321	29	F	S	I	29	Nasal blockade	Y	Bilateral, Partial	B	P	24	FESS	No	None	N	82	84	86	88	90	107	68	110
44	1723434	19	M	S	I	25.1	Nasal blockade	Y	Unilateral, Complete	U	C	5	FESS, Septoturbinoplasty	No	None	N	74	76	70	78	80	120	82	124
45	1717505	40	M	S	II	28	Nasal blockade	Y	Unilateral, Partial	U	P	8	FESS	No	Hypertension	N	82	89	88	87	82	138	86	135

S. no.	DBP(6hr)	SBP (8hr)	DBP(8hr)	SBP (10hr)	DBP(10hr)	SBP (12hr)	DBP(12hr)	SpO2 (4hr)	SpO2 (6hr)	SpO2 (8hr)	SpO2 (10hr)	SpO2 (12hr)	Tolerance for packing (Yes/No)	If No, hours after which packing was removed)	Pre-op Headache (2hr after packing)	Pre-op Headache before shifting to OR	Post-op Headache	Pre-op Nose ache (2hr after packing)	Pre-op Nose ache before shifting to OR	Post-op Nose ache
34	76	120	80	109	76	116	78	99	99	98	99	99	Yes		0	0	0	0	0	0
35	84	126	80	134	74	130	70	98	99	98	98	98	Yes		0	0	0	0	0	1
36	70	121	70	118	76	126	74	99	98	99	98	98	Yes		0	0	0	0	0	0
37	76	118	72	116	75	128	88	98	98	98	99	98	Yes		0	0	0	0	0	0
38	76	120	80	110	70	121	78	99	99	99	99	99	Yes		0	0	0	0	0	0
39	80	116	76	126	82	120	80	100	99	99	99	99	Yes		0	0	0	0	0	0
40	70	110	70	108	72	124	72	98	98	97	98	99	Yes		0	0	0	0	0	1
41	73	120	78	117	78	112	80	98	98	98	98	99	Yes		0	0	0	0	0	0
42	91	118	80	127	84	118	82	99	98	99	98	98	Yes		0	0	0	0	0	1
43	70	118	72	106	60	128	76	99	99	98	99	98	Yes		0	0	0	0	0	1
44	78	118	80	126	74	110	70	99	99	99	99	99	Yes		0	0	0	0	0	0
45	78	130	80	129	82	140	86	98	98	98	98	98	Yes		0	0	0	0	0	0

S. no.	Pre-op Ear ache 2 hr after packing	Pre-op ear ache before shifting to OR	Post-op ear ache	Pre-op Sneezing 2 hr after packing	Pre-op Sneezing before shifting to OR	Post-op Sneezing	Pre-op Difficulty sleeping 2 hr after packing	Pre-op difficulty sleeping before shifting to Or	Post-op Difficulty sleeping	Duration of Surgery (in minutes)	Volume of fluids transfused (in ml)	Estimated blood loss(ml)	Episode of Hypertension	Inj Esmolol given; Total dose	Hypotension
34	0	0	0	0	0	0	0	0	0	120	900	50	Y	30	N
35	0	0	0	0	0	0	1	1	0	135	1000	80	N		N
36	0	0	0	0	0	0	0	0	0	75	500	50	N		N
37	0	0	0	0	0	0	0	0	0	80	500	60	N		N
38	0	0	0	0	0	0	0	0	0	130	700	80	N		N
39	0	0	0	0	0	0	0	0	0	75	300	30	N		N
40	0	0	0	0	0	0	0	0	0	105	500	50	Y	10	N
41	0	0	0	0	0	0	0	0	0	75	600	50	N		N
42	0	0	0	0	0	0	0	0	0	90	600	50	N		N
43	0	0	0	0	0	0	0	0	0	80	500	40	N		N
44	0	0	0	0	0	0	0	0	0	105	700	70	N		N
45	0	0	0	0	0	0	0	0	0	90	600	50	Y	20	N

S. no.	Inj. Ephedrine dose(mg) if given	Post operative packing	Baseline HR	HR at 0 min	HR at 15 min	HR at 30 min	HR at 45 min	HR at 1 hr	HR at 75 min	HR at 90 min	HR at 105 min	HR at 2 hr	HR at 2hr 15 min	HR at 2hr 30min	HR at 2hr 45min	HR at 3hr	HR at 3hr 15min	HR at 3hr 30min	HR at 3hr 45min	HR at 4hr	HR at 4hr 15min	HR at 4hr 30min	HR at 4hr 45min	Baseline SpO2	SpO2 at 0 min	SpO2 at 15 min	SpO2 at 30 min	SpO2 at 45 min	SpO2 at 1hr	SpO2 at 75 min
34		Bilateral	80	100	103	88	92	104	86	87	92	98												98	100	99	99	99	99	98
35		Bilateral	92	99	89	88	80	78	76	78	77	80	86											98	100	100	100	99	100	99
36		Bilateral	82	100	90	84	85	90	94															99	100	100	100	99	100	99
37		Bilateral	76	94	87	82	76	75	74															98	100	99	99	98	99	98
38		Bilateral	88	110	92	86	85	84	79	78	80	78												99	100	100	100	99	100	100
39		Bilateral	68	99	100	87	80	76	80															99	100	99	99	100	100	99
40		Bilateral	94	116	104	100	92	87	90	84	88													98	100	99	98	98	99	99
41		Bilateral	78	99	87	82	76	74	80															99	100	100	100	100	100	99
42		Bilateral	94	101	99	90	87	90	92	99														99	100	100	100	99	100	99
43		Bilateral	90	107	104	87	86	82	89															100	100	100	99	99	100	99
44		Bilateral	76	84	89	85	82	76	74	78	86													99	100	99	100	100	100	98
45		Bilateral	78	100	112	105	97	90	92	87														98	99	99	98	98	99	98

S. no.	SpO2 at 90 min	SpO2 at 105 min	SpO2 at 2hr	SpO2 at 2hr 15min	SpO2 at 2hr 30min	SpO2 at 2hr 45min	SpO2 at 3hr	SpO2 at 3hr 15min	SpO2 at 3hr 30min	SpO2 at 3hr 45min	SpO2 at 4hr	SpO2 at 4hr 15min	SpO2 at 4hr 30min	SpO2 at 4hr 45min	Baseline SBP	Baseline DBP	SBP at 0 min	DBP at 0 min	SBP at 15 min	DBP at 15 min	SBP at 30 min	DBP at 30 min	SBP at 45 min	DBP at 45 min	SBP at 1hr	DBP at 1hr	SBP at 75 min	DBP at 75 min	SBP at 90 min	DBP at 90 mon
34	98	98	98												138	90	156	102	148	92	128	89	121	76	140	88	120	78	118	72
35	99	99	98	99											134	70	102	68	128	74	121	76	108	72	102	70	100	61	106	72
36															118	78	98	64	126	72	104	68	101	62	112	70	128	70		
37															132	78	100	58	118	68	105	66	102	60	101	61	114	68		
38	99	99	100												116	78	136	89	108	72	104	68	98	65	100	61	110	74	112	70
39															120	81	92	56	98	59	103	60	107	70	110	72	116	74		
40	98	98													128	78	142	91	129	92	120	76	116	72	108	70	102	68	110	74
41															127	80	135	90	111	70	102	68	100	62	98	64	112	82		
42	100														132	82	96	60	101	62	108	68	118	76	128	80	117	80	128	87
43															116	68	131	70	103	65	101	59	118	66	113	65	121	70		
44	98	99													124	76	102	68	101	66	100	61	109	70	112	76	116	72	118	82
45	99														142	90	158	101	147	98	132	86	127	82	120	80	118	78	126	88

S. no.	SBP at 105 min	DBP at 105 min	SBP at 2hr	DBP at 2hr	SBP at 2hr 15min	DBP at 2hr 15min	SBP at 2hr 30 min	DBP at 2hr 30 min	SBP at 2hr 45 min	DBP at 2hr 45min	SBP at 3 hr	DBP at 3 hr	sbp at 3hr 15 min	dbp at 3hr 15min	SBP at 3hr 30 min	DBP at 3hr 30 min	SBP at 3hr 45	DBP at 3hr 45	SBP at 4hr	DBP at 4hr	SBP at 4hr 15 min	DBP at 4hr 15 min	SBP at 4hr 30 min	DBP at 4hr 30 min	SBP at 4hr 45 min	DBP at 4hr 45 min	EtCO2 0 min post inductiio n	EtCO2 at 15 min	EtCO2 at 30 min	EtCO2 at 45 min
34	134	78	139	87																							38	37	36	36
35	110	72	118	74	129	78																					34	34	35	34
36																											37	36	36	35
37																											36	35	35	35
38	108	71	126	78																							38	36	35	34
39																											34	34	35	35
40	124	80																									36	37	36	35
41																											35	34	34	32
42																											36	33	34	35
43																											37	36	35	35
44	128	76																									35	35	34	35
45																											38	37	37	36

S. no.	EtCO2 at 1hr	EtCO2 at 75 min	EtCO2 at 90 min	EtCO2bat 105min	EtCO2 at 2 hr	EtCO2 at 2hr 15min	EtCO2 at 2hr 30min	EtCO2 at 2hr 45min	EtCO2 at 3hr	EtCO2 at 3hr 15min	EtCO2 at 3hr 30min	EtCO2 at 3hr45min	EtCO2 at 4hr	EtCO2 at 4hr 15min	EtCO2at 4hr 30min	EtCO2 at 4hr 45min	Baseline MAP	Emergence agitation	RASS at 0 min	RASS at 5 min	RASS at 10 min	RASS at 15 min	RASS after 15 min	Duration of Emergence Agitation (minutes)	Complications (if any)	Intervention done
34	35	35	36	36	37												106	N	0	0	0	0	0			
35	35	35	36	34	35	36											91	N	0	0	0	0	0			
36	34	34															91	N	0	0	0	0	0			
37	34	35															96	N	0	0	0	0	0			
38	34	35	34	35	36												91	N	0	0	0	0	0			
39	35	34															94	N	0	0	0	0	0			
40	36	35	35														95	N	0	0	0	0	0			
41	34	33															87	N	0	0	0	0	0			
42	34	34	34														99	N	1	0	0	0	0			
43	34	34															87	N	0	0	0	0	0			
44	34	34	35	35													92	N	0	0	0	0	0			
45	35	35	36														98	N	0	0	0	0	0			

S. no.	HR 0 min After extubation	HR 5 min after extubation	HR at 10 min	HR at 15 min	HR after 15 min	SBP 0 min after extubation	SBP at 5 min	SBP at 10 min	SBP at 15 min	SBP after 15 min	DBP 0 min after extubation	DBP at 5 min	DBP at 10 min	DBP at 15 min	DBP after 15 min	SpO2 0 min after extubation SpO2 at 5 min	SpO2 at 5 min	SpO2 at 10 min	SpO2 at 15 min	SpO after 15 min	RR 0 min after extubation	RR at 5 min	RR at 10 min	RR at 15 min	RR after 15 min	Cough
34	112	109	103	92	88	147	140	136	130	128	95	90	78	74	72	97	98	98	98	99	12	13	14	17	18	Present
35	98	101	99	96	88	130	126	121	116	110	78	73	70	72	72	98	98	99	98	98	14	16	16	18	18	
36	92	108	102	99	86	139	130	126	120	112	78	77	72	72	70	98	98	97	98	98	14	15	16	18	18	
37	102	94	87	86	82	138	126	121	126	130	78	79	70	74	74	98	98	98	99	98	13	16	17	18	20	
38	96	100	90	92	88	128	121	118	118	121	74	76	76	70	72	98	97	98	98	99	14	15	18	18	20	
39	92	88	89	82	80	131	126	120	121	116	80	81	82	72	74	99	99	99	99	99	14	15	16	18	20	
40	102	100	101	96	90	129	128	130	121	118	89	89	70	74	76	98	98	98	97	98	11	12	14	15	18	
41	110	102	97	87	82	134	130	128	120	121	82	85	76	80	82	98	99	98	98	98	11	12	14	16	18	
42	112	106	100	99	95	137	132	128	128	126	92	89	82	80	84	97	97	98	98	97	10	12	14	16	18	
43	100	98	92	90	92	128	126	121	126	129	78	75	82	70	70	98	98	98	99	98	12	14	14	16	17	
44	99	97	92	87	82	127	126	120	116	120	82	75	80	74	76	97	98	98	98	98	14	15	16	18	18	
45	102	98	96	90	92	130	128	134	130	138	90	92	86	80	90	98	98	98	98	98	12	12	14	16	18	

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Subject:: Approval of Plan of Thesis.

This is to inform you that the Faculty of Medical Sciences in its meeting held on 25.09.2023 has approved the plan of thesis of **Ilmjot Kaur Tiwana,** a student of your college for **MD Anaesthesiology** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Effect of preconditioning with nasal packing on emergence agitation in patients undergoing nasal surgery .

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The student may submit the thesis in triplicate alongwith the plan in triplicate also, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Controller of Examinations

Note :
1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*

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EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF MEDICINE

IN

ANAESTHESIOLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

JUNE 2022

DR. ILMJOT KAUR TIWANA

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ABSTRACT OF PLAN OF THESIS

Title	**EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY**
For the degree of	M.D. Anaesthesiology
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Institution	Dayanand Medical College & Hospital, Ludhiana
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Introduction: Emergence agitation (EA), defined as restlessness, disorientation, excitation, and/or inconsolable crying, is a common phenomenon during early recovery from general anaesthesia. It may lead to respiratory compromise, nausea, vomiting, and may also cause an increase in blood pressure, heart rate, and myocardial oxygen consumption . Although EA is not a prolonged condition, it increases the risk of self-injury and delayed discharge, and raises medical care costs. It is obvious that effective EA prevention improves the clinical outcomes. Nasal surgeries are considered an independent risk factor for emergence agitation,due to nasal cavity packing postoperatively. Whether preoperative nasal packing reduces post op agitation in these patients, is a less explored field.

Aim of Study: We propose to study whether preconditioning with preoperative nasal packing reduces emergence agitation in adult patients undergoing nasal surgery under general anaesthesia.

Materials & methods: A randomised control study will be conducted on 90 patients divided into 2 groups. The study group will undergo nasal packing with saline soaked hydroxylated polyvinyl acetate sponge (merocel) at least 12 hours before surgery. The control group will not undergo any intervention. Both groups will undergo general anaesthesia in accordance with the same technique. Post operative emergence agitation will be assessed in both groups using Richmond's Agitation Sedation Scale (RASS).

Clinical Significance: In this study, we will adopt the nasal packing and mouth breathing training to simulate the sensory discomfort experienced after nasal surgery. We will test nasal packing and mouth-breathing training as non-drug modalities, to study its influence on emergence agitation after nasal surgery in adults.

Keywords: Emergence agitation, Nasal surgery, RASS

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CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY"** exist in the Department of Anaesthesiology at DMC&H, Ludhiana and will be provided to be candidate of will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate herself under our supervision and guidance.

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4	DATE OF ADMISSION OF COURSE	02/ 05/ 2022
5	TITLE OF THE TOPIC	EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Emergence agitation is an “unpleasant state of extreme arousal”, and a commonly observed symptom in patients suffering from pain, anxiety, fear and hypoxia[1]. It is a common complication arising in the immediate post anaesthetic period after general anaesthesia.[2] It involves disorientation, excitation, non-purposeful movements, inconsolability and possible violent behaviour. Though presentations vary, non purposeful thrashing, restlessness, and disorientation are commonly seen; patients usually appear detached and respond poorly to verbal commands. This can lead to severe outcomes including, removing intravenous lines or central lines, nasogastric tubes, catheters etc., increased pain, haemorrhage and can predispose patients to further adverse events including aspiration pneumonia or subsequent surgery for re exploration of surgical sites.[3-10]

Lepouse et al concluded that emergence agitation proves costly as it necessitates increased use of pharmaceuticals, staff and lengthens the stay in PACU. Emergence agitation costs the patients in terms of morbidity, human resources and on a financial level. Self-extubation and removal of catheters can lead to aspiration or emergency surgery. As far as human resources are concerned, it can require up to six staff members to restrain an agitated patient.[11]

Emergence agitation differs from emergence delirium. These terms are not synonymous with one another.[4] It is often impossible to differentiate pure “agitation” from “delirium”. Delirium implies a specific set of thought disorders and hallucinations. While EA manifests during the transition into consciousness, delirium, by definition, is an acute and typically reversible change in consciousness (ie, mentation is already present and established, though impaired) coupled with inattention and cognitive deficits. Any agitation that takes place while the patient is already demonstrating meaningful eye contact or verbalising needs (ie,

situational awareness) should be considered as Post Operative Delirium. The typical presentation of EA is the association of agitation together with a confusional state without recognition of the surrounding environment. Patients are typically kicking and tilting, holding their head backward, agitated, inconsolable, and have no eye contact with their family members or caregivers.[5] EA should also be differentiated from postoperative cognitive dysfunction (POCD), a prolonged postoperative state of altered mentation and cognitive deterioration with an increased risk of morbidity.[9]

EA episodes are very brief. This makes sense given the rapid metabolism of many modern anaesthetic agents. For instance, average durations of adult EA episodes range from 40–66 seconds to 2–3 minutes. The finding that EA rates drastically fall when measured in the PACU compared to the OR further supports EA as a time-limited process.[5]

The overall incidence of Emergence agitation varies from 5-30% depending on variables such as age,type of surgery, presence of a urinary catheter or an endotracheal tube, pain intensity, current smoking, and male sex.[9] The incidence of Emergence agitation in Nasal surgeries has been reported between 12%-55%.[3,6]

The exact mechanism of emergence agitation is not known but certain theories and predictors have been studied that are related to its increased incidence. The proposed risk factors include pre-operative anxiety related to surgery, psychological immaturity, type of surgery, young age, new environments, type of anaesthesia particularly inhaled anaesthetics with low blood gas partition coefficients, post operative hypoxia, rapid awakening from anaesthesia, post operative pain and discomfort, physiologic condition (eg: sepsis, hypoglycemia, electrolyte imbalance, hypoxemia, hypercapnia, and residual medication effects) and many others.[3,5,9,10,12-15] These factors cumulatively may lead to increased sympathetic tone resulting in an excited state during recovery from anaesthesia.

Nasal surgeries are identified as an independent risk factor for emergence agitation[3]. In patients undergoing any type of nasal surgery, nasal packing is done in order to achieve hemostasis and to prevent adhesions. This nasal packing causes discomfort and suffocation which might be a contributor in emergence agitation. Increased incidence of emergence agitation in nasal surgeries might also be due to sudden loss of functional senses and discomfort to surgical organs. Also, a tracheal tube can be distressing in partially awake patients[11].Such a situation can be more stressing in nasal surgery patients postoperatively, as the nasal cavities are packed.

Various agitation scales are being used to stratify the degree of postoperative emergence agitation. The Richmond agitation sedation scale (RASS) is widely accepted for stratification of emergence agitation[16].

Hemodynamic parameters including heart rate (HR), Non-invasive Blood pressure (NIBP), end tidal carbon dioxide (EtCO2), respiratory rate, oxygen saturation (SpO2) are also altered during emergence, hence recording these parameters helps in monitoring emergence agitation. Current literature on emergence agitation mainly focuses on the paediatric population. Also, only the pharmacological management of EA using ketamine, dexmedetomidine, tramadol, intravenous anaesthetics etc has been studied[1,7,10,13,]. The non pharmacological measures have not been explored enough. Therefore, we propose to study whether preconditioning the patients undergoing nasal surgery with nasal packing preoperatively can reduce the incidence of emergence agitation in adult patients.

6.2 REVIEW OF LITERATURE

Emergence Agitation is a well-known phenomenon in the postoperative period. However, the literature concerning this clinical problem among adults is limited. Many times EA is grouped with postoperative delirium (POD) and misnamed as “emergence delirium” (“ED”), this hyperactive state is limited to the emergence period after general anaesthesia before regaining full consciousness.

Yu et al. in 2010 studied that doxapram administration, pain and presence of a tracheal tube and/or a urinary catheter appear to be the most important causes of postoperative agitation. To avoid this complication, they suggested, whenever possible, to use intravenous anaesthesia, to remove endotracheal tubes and urinary catheters as early as possible, and to provide adequate postoperative analgesia.[14]

The overall incidence of emergence agitation in nasal surgeries was 22.2% Iin a study done by Kim HJ et al. Patients in the PACU with a RASS of >-+1 at any time were considered to have emergence agitation. Six variables were found to be significantly associated with emergence agitation: younger age, recent smoking, sevoflurane anaesthesia, postoperative pain on the numerical rating scale (NRS)≥5, presence of a tracheal tube, and presence of a urinary catheter.[2]

In a randomised controlled trial done by Kim SY et al in 2013 it was concluded that intraoperative infusion of dexmedetomidine provided smooth and hemodynamically stable emergence. It also improved the quality of recovery after nasal surgery.[7]

Chen et al in 2014 investigated emergence agitation in patients after craniotomy. The sedation-agitation scale was evaluated during the first 12 hours after surgery. Independent predictors for agitation included male sex, history of long-term use of anti-depressant drugs or benzodiazepines, frontal approach of the operation, method and duration of anesthesia and presence of endotracheal intubation. TIVA and balanced anaesthesia with short duration were identified as protective

factors.[15]A prospective, randomised, single-blind, clinical trial including 80 patients performed by Jo JY et al in 2017 undergoing open rhinoplasty, septoplasty, turbinoplasty, endoscopic sinus surgery, and functional endoscopic sinus surgery under general anaesthesia who were randomised to receive total intravenous anaesthesia (TIVA) or volatile induction and maintenance of anaesthesia (VIMA). The occurrence of emergence agitation was defined by a RASS score of at least 1 and a Riker Sedation-Agitation Scale score of at least 5 immediately after extubation. It was concluded that occurrence of emergence agitation after nasal surgery under general anaesthesia can be significantly reduced by using TIVA rather than VIMA.(2.5% in TIVA vs 20% in VIMA.[13]Jee et al in 2017 performed a prospective, double-blind study,in which 100 adult patients were allocated randomly to 1 of 2 groups (each n=50). Patients received nefopam immediately after induction of anaesthesia (nefopam group) or 100mL of saline (control group) in the same mannerIt was found that Nefopam infusion is effective in preventing and reducing the severity of EA after nasal surgery without a delay in extubation.[17]

Elsersy EM et al. in 2017 examined 140 ASA 1 and 2 patients who were randomly allocated to either premedication group that received Phenergan 25 mg IM and atropine 0.5mg IM or none premedication group that received an equal volume of water for injection intramuscular injection. It was concluded that premedication with atropine and Phenergan, pain, smoking, young age, male gender as risk factors for the development of postoperative agitation in adults following Functional Endoscopic Sinus Surgery.[18]

A study by Kasem et al in 2017 was conducted to evaluate the effectiveness of preoperative external nasal compression on the incidence of postoperative agitation in nasal surgeries. Sixty adult patients of ASA I or II, between 20 and 45 years of age of both sexes, nonsmokers, with BMI less than or equal to 30, who were scheduled to undergo nasal surgery under general anaesthesia, in which unilateral or bilateral nasal

packing was planned to be used until 24 h after surgery, were included in the study.[19]

A study protocol has been proposed by Xu et al in 2020 on effects of preconditioning by nasal splint and mouth breathing on emergence delirium after functional endoscopic sinus surgery(FESS). This RCT will include 200 patients who undergo FESS. The pretreatment group (P-group) will receive an intervention by nasal splint and mouth-breathing training before surgery, while the control group (C-group) will not receive any intervention; following which both groups will undergo FESS under general anaesthesia in accordance with the same anaesthesia scheme. After surgery, a single-blinded assessment of ED occurrence with stratification will be performed.[3]

Menser et al in 2020 discussed epidemiology of emergence agitation and delirium in the paediatric population and described the possible impact of long-term consequences of emergence delirium among infants and children.[4]

A meta-analysis done by Wei et al in 2021 concluded that male, smoking, urinary catheter, and post-operative pain are the risk factors, while age, inhalational anaesthesia, history of substance misuse, and intraoperative use of benzodiazepines are the possible risk factors for adult EA.[12] In a narrative review Tolly et al described a framework to distinguish EA from delirium.This review summarised current knowledge of EA risk factors, mechanisms, and adult management strategies. Use of dexmedetomidine, ketamine, BIS for depth of anaesthesia, multimodal analgesia, and non pharmacological measures including preoperative rassurance etc are discussed for the management of EA.[5]

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To compare the effect of preoperative preconditioning with nasal packing on emergence agitation in patients undergoing nasal surgeries.
- To study patients tolerance preoperatively and postoperatively.

7. MATERIALS AND METHODS

7.1 SOURCE OF DATA

This study will be a randomised controlled trial, comprising a control group and a study group. A total of 90 patients of either sex scheduled for elective nasal surgery (septoplasty and rhinoplasty with or without osteotomies, endoscopic nasal surgery) under general anaesthesia will be enrolled in the study. Approval will be obtained from the Institutional Ethics Committee (IEC) for the same. Patients will be randomly divided into 2 groups; Group C and Group S.

Group C- Control group

Group S- Study group-The group receiving preoperative nasal packing.

Written and informed consent will be obtained from all patients.

7.2 METHOD OF COLLECTION OF DATA

INCLUSION CRITERION

1. Patients undergoing elective nasal surgeries
2. Age between 18 to 60 years
3. American Society of Anaesthesiologists Classification (ASA) class I–II.

EXCLUSION CRITERION

1. ASA grade III-VI
2. Emergency cases
3. History of mental illness.
4. History of sedative or antipsychotic drug use (neuroinhibitors, anxiolytics, antidepressants, benzodiazepines) for any reason.
5. History of neurological diseases (cerebral infarction, transient ischaemic attack, Parkinson's disease, mental retardation, cranio-cerebral injury).
6. Concurrent neuromuscular blockade or quadriplegia
7. Patients with Mucormycosis or any fungal infection involving nasal cavity and orbit.
8. Refusal to participate in study

During pre anaesthetic check up, patients in both groups will be informed about nasal packing which will be in situ postoperatively and counselled to breathe by mouth during that period.

In the patients of the study group after counselling, bilateral nasal packing will be done with saline soaked merocel by an ENT resident, 12 hours prior to surgery. It will ensure that patients do not breathe through the nose, and hence breathe entirely through the mouth. The control group patients will not undergo any intervention.

In both groups, oxymetazoline nasal drops will be put every 2 hours, starting 12 hours prior to surgery for the purpose of decongestion. Patients' vitals including heart rate, blood pressure and SpO_2 will be monitored overnight at 2 hour intervals by the nursing staff on duty.

Patient tolerance will be assessed using the following score at 2 hour after nasal packing and just prior to shifting the patient to OR.[20] Patients who will not tolerate nasal packing, it will be removed and they will be excluded from study.

Nasal Packing Survey items

	Not a problem	Very mild problem	Moderate problem	Fairly bad problem	Severe problem
Headache	0	1	2	3	4
Nose Ache	0	1	2	3	4
Ear ache	0	1	2	3	4
Sneezing	0	1	2	3	4
Difficulty Sleeping	0	1	2	3	4

After shifting the patients to OR, monitors will be attached to record vitals. Preoxygenation will be done using 100% oxygen for 3 minutes. Premedication with Inj. midazolam 0.1mg/kg i.v. Inj. fentanyl 1.5mcg/kg i.v., Inj. dexamethasone 8mg i.v. and Inj. Glycopyrrolate 0.2mg IV. General anaesthesia will be induced by using 5mg i.v atracurium as priming dose followed by propofol 1.5–2 mg/kg intravenously until the loss of eyelash reflex. Muscle relaxation will be achieved by Inj. atracurium 0.5 mg/kg IV and oxygenation will be continued for 3 minutes. Orotracheal intubation will be performed using a 7.5mm and 8.5mm tracheal tube for women and men, respectively. Once the patient is intubated, all patients will be laid in an approx. 30° reverse trendelenburg position to reduce the amount of bleeding and the surgeon will instill 1:10000 Adrenaline drops into the nasal packing in the study group. In the control group cotton gauze/patty soaked with 1 in 10 adrenaline will be put into both nares. This packing will be removed after 5 minutes and surgery will be started. Monitoring with electrocardiography, pulse oximetry, non-invasive BP and capnography will be done every 5 minutes.[7]

Maintenance of anaesthesia will be sustained with sevoflurane 2-4%, nitrous oxide 50% and oxygen 50% to keep the BIS in the 40-60 range. Mechanical ventilation will be continued to provide an end-tidal carbon dioxide level of 32-36 mmHg.[18] Muscle relaxation will be maintained using 0.08-0.1mg/kg iv bolus of Atracurium. MAP will be maintained between 60-65 mm Hg using 10mg i.v. incremental doses of inj. Esmolol. Inj. Paracetamol 1gm i.v. will be given 30 minutes prior to extubation for the purpose of analgesia. Volatile anaesthetic will be turned off just before the beginning of nasal packing. Once the surgery is complete, flows of oxygen and nitrous oxide will be increased to eliminate residual volatile anaesthetic from the breathing circuit. VCV mode of mechanical ventilation will be turned into PCV, oral suction will be performed, and patients will be reversed (glycopyrrolate 0.4mg and

neostigmine 2.5mg intravenously) after confirming the return of neuromuscular function.

Extubation will be done, by the same consultant in all cases, at the return of spontaneous ventilation with Bispectral index >70. It will be considered a smooth extubation when there will be no gross purposeful movements at the time of extubation. If the patients develop laryngospasm or breath holding spell immediately after extubation, they will be considered as not being extubated smoothly. Respiratory complications such as breath holding, laryngospasm and desaturation will be noted and treated. Patients will be given oxygen 6 litres/min via face mask. Adequacy of the airway will be assessed by SpO2 values, auscultation, observation of patients' chest movement and EtCO2 waveform with sampling cannula placed within the facemask. Coughing and other respiratory complications will also be recorded.[21]

RASS score will be measured immediately after extubation and in patients with emergence agitation, duration and intensity of emergence agitation will also be noted.[1,6] The highest RASS scores of the patients will be recorded, and patients with a Richmond Agitation–Sedation Scale score of ≥ +1 at any time will be considered as having EA[1]. When the RASS score becomes zero(i.e. the patient is alert and calm), this will be considered as the end point of emergence agitation. If physical restraining or haloperidol will be required in severe cases, it will also be recorded.[22]

A nasal packing survey for grading patients' tolerance will also be performed postoperatively in PACU in both the groups before discharge from the PACU.

RICHMOND AGITATION SEDATION SCALE(RASS)

SCORE	TERM	DESCRIPTION
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent nonpurposeful movement, fights ventilator
+1	Restless	Anxious but movements not aggressive or vigorous
0	Alert and Calm	
-1	Drowsy	Not fully alert, but has sustained awakening (eye-opening/eye contact) to voice (>10 seconds)
-2	Light Sedation	Briefly awakens with eye contact to voice (<10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but no eye contact)
-4	Deep Sedation	Movement or eye opening to voice (but no eye contact)
-5	Unarousable	No response to voice or physical stimulation

OUTCOME:

Primary outcome: Effect of preconditioning with nasal packing on Emergence agitation.

Secondary outcome: Intensity and duration of emergence agitation. Effect of nasal packing both preoperatively and postoperatively on patient tolerance.

NUMBER OF CASES

SAMPLE SIZE CALCULATION

By using previous study by Kim HJ et al[2], it was observed that the incidence of emergence agitation was 22% in group C and 1% in group S. Taking these values as reference, the minimum required sample size with 80% power of the study and 5% level of significance is 45 patients in each study group.

The formula used in the situation is as under:

$$n = \frac{[Z_{1-\alpha/2}\sqrt{2}\,P(1-P) + Z_{1-\beta}.\sqrt{\{P1(1-P1) + P2(1-P2)\}}]2}{(P1-P2)\,2}$$

Where P= (P1+P2)/2

- Approximate value of efficacy/cure rate for standard treatment =P1
- Approximate value of efficacy/cure rate for other treatment = P2
- Effect size = (P2-P1)
- Level of significance (usually 5%)

Zα = Value of standard normal variate corresponding to α level of significance (1.96) and Zβ = The standard normal deviate for desired power (0.842)

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ±standard deviation (±SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. To determine whether the data is Normally

distributed, a Kolmogorov-Smirnov test will be used. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and Fisher exact test was used when the expected frequency is less than 5. A probability value (p value)less than 0.05 will be considered statistically significant. All statistical calculations will be done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Yes. Patients in the study group will undergo nasal packing with saline soaked Merocel 12 hours prior to surgery, after informed written consent.

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached here with.

LIST OF REFERENCES

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PROFORMA

Serial no.	Group: C or S	ASA Grading:
MRD No.	Date of surgery:	BMI:
AGE/SEX	Drug Allergy:	DOA:

Significant History:

1. Chief complaint
2. Type of nasal obstruction- U/L or B/L; Partial or Complete
3. Duration of Nasal Obstruction
4. H/O OSA
5. Type of surgery planned

Comorbidities:

Diabetes( ) Any other( )
Hypertension( )
Thyroid disease( )

History of smoking:
History of alcohol use:

Overnight vitals:

	4hr	**6hr**	**8hr**	**10hr**	**12hr**
HR					
BP					
SpO_2					

Tolerance for nasal packing (in group S): Yes/No

Signature of Candidate Signature of Supervisor

Patient tolerance:

	Preoperative Score (2 hr after packing) (0-4)	Pre-operative Score before shifting to OR(0-4)	Postoperative Score(0-4)
Headache			
Nose ache			
Earache			
Sneezing			
Difficulty sleeping			

Intraoperative assessment:

1. Duration of surgery
2. Volume of fluids/blood transfused
3. Estimated blood loss
4. Episode of hypo/hypertension; intervention done
5. Type of nasal packing after surgery
6. Injection Esmolol i.v. given or not and total dose:

	HR	SpO_2	BP	$EtCO_2$	Inj. Esmolol	Dose
Baseline						
0 min (post induction)						
15min						
30min						
45min						
1 hr						
75min						
90min						
105min						
2hr						
135min						

Signature of Candidate

Signature of Supervisor

After Extubation:

	0 min	5 min	10 min	15 min	After 15 min
RASS					
HR					
BP					
SPO2					
RR					
Breath holding spell					
Cough					
Laryngospasm					
Intervention done for complications(if any)					

Duration of emergence agitation:

Signature of Candidate

Signature of Supervisor

INFORMED PATIENT CONSENT

Date: _____

I…… D/o, W/o, S/o ……. …… am willing to participate in the study **"EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

……	……
Signature of the Witness	Signature of the patient
Name:	

Signature of Candidate **Signature of Supervisor**

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____ इस शोधकार्य **"EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____	_____
गवाह के हस्ताक्षर	रोगी के हस्ताक्षर/अंगूठे का निशान
नाम:	नाम:

_____

अन्वेषक केहस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____ ਵਾਸੀ _____ **“EFFECT OF PRECONDITIONING WITH NASAL PACKING ON EMERGENCE AGITATION IN PATIENTS UNDERGOING NASAL SURGERY”** ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ–ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ